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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Campbell, E. H., Jr.: Compound, Comminuted Skull Fractures Produced by Missiles. *Ann. Surg.*, 1945, 122: 375.

One hundred cases of compound, comminuted fractures of the skull produced by missiles are analyzed. More wounds were caused by shell fragments than by all other means. Inner table fractures were sometimes overlooked and occasionally led to serious complications. Tripod incisions often gave trouble; it is recommended that they be avoided when possible. Convulsions were uncommon in the first few weeks; their occurrence was sometimes an early manifestation of abscess formation. Subdural hematoma was present in but 2 cases. Nineteen patients developed superficial wound infections of varying degrees, while 22 developed deep-seated infections. These were manifested by abscess, meningitis, cerebral fungus, or some combinations thereof. There were 5 deaths, all of which occurred in the latter group.

Incomplete débridement was the largest single factor contributing to wound infection. In those cases in which all bone fragments had been removed, infection was uncommon and seldom deep; whereas, if débridement had been incomplete or had not been performed at all, infection was common and usually deep. Bacteria cultured from these wounds were principally skin inhabitants of low virulence.

Treatment consisted in the evacuation of pus and removal of associated bone fragments and/or metallic foreign bodies, as well as of adjacent necrotic tissue and old blood. Abscess capsules were disturbed as little as possible. Sulfonamide therapy was employed as an adjuvant. Failures resulted only in those 5 cases in which, for one reason or another, this procedure was not carried out.

Experience, judgment, and skill, as well as proper neurosurgical armamentarium are prerequisites to good primary débridement. It is recommended, therefore, that patients with severe head wounds be evacuated as directly as possible to a hospital in which these are available, even though a few additional hours be required.

Following the submission of this article in April, 1944, the number of penetrating wounds of the skull treated in the Mediterranean theater of operations increased several fold. Figures based upon 974 cases from the Tunisian, Sicilian, and Italian campaigns show the incidence of deep infection to have been 12.2 per cent. During the past year in particular, débridement has been carried out with more thoroughness. Penicillin therapy (25,000 units given intramuscularly every three hours) has been the routine procedure. As a result, the rate of deep infection has been further reduced.

JOHN E. KIRKPATRICK, M.D.

EYE

Bland, J. O. W., and Wilson, R. P.: Bacteriological and Clinical Observations on the Treatment of the Acute Ophthalmias of Egypt with Sulfonamides and Penicillin. *Brit. J. Ophth.*, 1945, 24: 339.

The authors describe their bacteriological and clinical observations on the treatment of the acute ophthalmias of Egypt with sulfonamides and penicillin. They point out that the acute ophthalmias of Egypt are caused by bacteria which are sulfonamide-sensitive and that treatment with sulfonamides is simple, safe, and effective. Sulfonamides provide the solution (for Egypt and other oriental countries) not only for the treatment of affected patients but also for checking and eradicating yearly epidemics, because they reduce the period of discharge from 6 to 1 or 2 days and render cases noninfective 12 hours after administration of the drug.

For every 10 kgm. of bodyweight, 0.5 gm. of sulfonamide was given in 24 hours, as two doses, a single dose corresponding to the usual 6-hour dose, which yields a concentration of from 5 to 10 mgm. per 100 c.c. of blood. Because the dosage based on bodyweight is not always convenient or practical, and because most cases occur in children under 10 years of age, a dosage based on age is suggested: twice daily ¼ tablet (½ gm. tablet) at from 0 to 3 months, ⅓ tablet at from 3 to 6 months, ²/₅ tablet at from 6 to 12 months. ½ tablet at 1 year, ¾ tablet

at 3 years, 1 tablet at 6 years, 1½ tablets at 10 years, and 2½ tablets at 20 years.

The authors conclude as follows regarding the acute epidemic ophthalmias (Koch-Weeks and gonococcal) of Egypt:

1. A single dose of sulfonamide reduces the bacteria in 4 hours and suppresses them in about 12 hours, which cures a considerable proportion of gonococcal cases by a single dose, except the more resistant Koch-Weeks cases.

2. Two doses of sulfathiazole or sulfadiazine in one day at an 8-hour interval will cure practically all cases except Koch-Weeks cases.

3. Two doses on 2 successive days will cure all cases of gonococcal and Koch-Weeks ophthalmia.

4. A single intramuscular injection of penicillin reduces gonococci to nil in 3 or 4 hours; however, repeated doses are necessary at short intervals to ensure a cure because relapses may occur in from 10 to 12 hours after a single dose.

5. As penicillin has no effect on Koch-Weeks cases, it is unsuitable for treatment of acute Egyptian ophthalmia. JOSHUA ZUCKERMAN, M.D.

EAR

Machle, W.: Effects of Gun Blasts on Hearing. *Arch. Otolar.*, Chic., 1945, 42: 164.

The characteristics of the hearing loss following controlled exposure to gun blast are like those of deafness from sustained high noise levels. Acoustic injury and loss are common in gunnery instructors, artillerists, and others; potentially serious partial deafness may be expected to occur in significant numbers of military personnel. With repeated equal exposures, acoustic damage is cumulative, apparently largely because recovery from the initial traumatic response is incomplete in the 24-hour intervals.

Partial recovery of hearing regularly occurs in the first few days after cessation of repeated daily exposures up to six or eight. The rate and the extent of the ultimate recovery from the losses following long periods of exposure need to be further defined. After months of exposure, recovery to pre-exposure levels of acuity is doubtful; there was evidence of partial recovery in only 2 of 10 men studied.

Preliminary observations indicate that the obvious relationship between magnitude of exposure, measured by blast pressures, and the resultant hearing loss cannot be narrowly defined because of great variability in the response of individual subjects, as well as uncontrollable variables in the behavior of blast waves. NOAH D. FABRICANT, M.D.

Perlman, H. B.: Reaction of the Human Conduction Mechanism to Blast. *Laryngoscope*, 1945, 55: 427.

An experimental investigation of the effect of explosions on the human conducting mechanism was carried out on fresh temporal bones.

The stimulus used was the shock pulse from a 32-caliber blank cartridge fired from a starting pistol held near the external auditory canal of the fresh preparation.

Protection to the ear is considered and illustrative records are presented. JOHN F. DELPH, M.D.

Shilling, C. W.: Aero-Otitis Media and Loss of Auditory Acuity in Submarine Escape Training. *Arch. Otolar.*, Chic., 1945, 42: 169.

Since 30 per cent of the men undergoing submarine escape training at the United States Submarine Base at New London, Connecticut, have had aural difficulty leading to aero-otitis media and resultant loss of auditory acuity, the author presents an analysis of the extent of the damage associated with this training and outlines possible preventive and therapeutic procedures.

He believes certain preliminary observations can be made and some opinions hazarded at this time:

1. All ears showing severe damage, grades 3 and 4, have thus far been found to have flattening of the eustachian orifices due to lymphoid hyperplasia, and thus roentgen rays and radium should be of great benefit.

2. Aero-otitis media has been noted to be associated with a depressed prepressure audiometric curve.

3. Under conditions of careful selection of the patients and proper administration of pressure, severe otopathological observations with associated losses of acuity need not be as common as they have been.

4. Since this type of trauma leads to acute auditory damage, repeated trauma may result in permanent auditory damage.

NOAH D. FABRICANT, M.D.

Barton, R. T.: The Influence of Pregnancy on Otosclerosis. *N. England J. M.*, 1945, 233: 433.

The records of 133 otosclerotic women who had experienced one or more pregnancies were reviewed. Sixty-four per cent were stated to have been made worse by at least one of their pregnancies. Over half of these experienced the onset of hearing loss immediately after parturition (during the lactation period), and 29 per cent 6 months or more afterward. Seventy per cent noted the hearing loss in the first pregnancy, 16 per cent in the second, and the others from the second to the seventh pregnancies.

In 50 per cent of the cases the hearing loss was noted only during one pregnancy and unaffected by others.

The conclusion is made from the review that many otosclerotic patients are adversely affected by pregnancy, but there is little uniformity in the time of onset of the impairment and no regularity in the effect of successive pregnancies.

No records of the hearing before and after pregnancy are presented in the article.

The literature is reviewed on the question of interruption of pregnancy. The author concludes that abortion is never justified because (1) the effect of pregnancy on otosclerosis is unpredictable; (2) abor-

tion may not arrest the progression of the deafness; and (3), the disease does not endanger the life of the mother. JOHN R. LINDSAY, M.D.

Allman, C. H.: Penicillin in Otology. *J. Am. M. Ass.*, 1945, 129: 109.

In a series of 5,640 cases of scarlet fever, 9 per cent of the patients developed otitis media. Typings of the organisms cultured from the throats were done on 3,000 of these patients and all showed Streptococcus hemolyticus type 17. These organisms were resistant to sulfadiazine in in vitro studies. Over 75 per cent of the patients with scarlet fever had received sulfadiazine prophylactically, from a few days to two months prior to the development of the disease. About 10 per cent of the patients had received penicillin from the time of onset of the disease, and in these the incidence of otitis media was reduced approximately one-half.

All patients with otitis media received 10,000 Oxford units of penicillin by intramuscular injection every three hours from the onset of the condition until two days after all signs had subsided. Local treatment to the ear was limited to dry wiping or, in some cases, hot saline irrigations. There were 33 cases (0.56%) requiring mastoidectomy. In these, the operative wound also was irrigated with penicillin solution through a soft rubber tube secured in the cavity, which otherwise was closed. From 5 to 10 c.c. of a solution containing 500 units per cubic centimeter was instilled every four hours.

All of the patients recovered, and there was not a single case of a chronic discharging ear. With the exception of 3 cases in which the lateral sinus was opened, recovery was complete within a period of seven days.

There were 2 cases of meningitis in patients who had not received penicillin. Mastoidectomies were done on both patients. They were given 100,000 units of penicillin intravenously the first twelve hours, 15,000 units intrathecally, immediately, 10,000 units intramuscularly every 2 hours for 2 days, and every 3 hours thereafter until recovery was complete. Four grams of sodium sulfadiazine every 6 hours for a period of 2 days was also given intravenously. Recovery was rapid.

Penicillin was used in the same way in 14 cases of nonscarlet fever mastoiditis, with equally good results.

The use of penicillin is given credit for the reduction of morbidity to a minimum in this large group of cases of otitis media, and there were no deaths.
JOHN R. LINDSAY, M.D.

Macbeth, R. G.: A Series of 50 Cases of Acute and Subacute Mastoiditis Treated by Closure of the Wound and Perfusion with Penicillin. *J. Lar. Otol.*, Lond., 1945, 60: 16.

A series of 50 cases of acute or subacute mastoiditis in which penicillin was used postoperatively by perfusion are presented by the author. Unusual care was taken to get as complete hemostasis as possible, following which a fine rubber tube was inserted at the upper end of the wound and sewn into place. The wound was closed completely. Penicillin solution was then run into the wound until it oozed out of the incision line. The concentration varied from 250 to 500 units per cubic centimeter.

Dressings were not disturbed for 5 days. During this time, at 6-hour intervals, the wound was evacuated and then filled with the penicillin solution.

Of the 50 cases treated, 9 were failures from the standpoint of early healing but all eventually healed.

The predominant organism was the streptococcus hemolyticus.

No severe complications resulted and the technique was carried out easily by the nursing staff.
JOHN F. DELPH, M.D.

MOUTH

Thoma, K. H.: Functional Disturbances following Fracture of the Mandibular Condyle, and Their Treatment. *Am. J. Orthodont.*, 1945, 31: 575.

The causes, diagnosis, treatment, and prevention of complications following the treatment of condylar fractures are described by the author. Five cases presenting major functional disturbances are reported. In order to obtain a clear picture of the condition present, recommendations are advanced regarding the use of various positions in x-ray examination.

The prevention of complications includes exact reduction by the open method and internal wiring, plating, or skeletal fixation. In fractures with displacement, interosseous wiring gives excellent results; in fracture dislocation, skeletal fixation of the condyle to the temporal bone is recommended in addition to the wiring. The two methods may be replaced by the use of the Sherman plate. Two cases of fracture dislocation illustrating the two methods are presented. NOAH D. FABRICANT, M.D.

NECK

Harrington, S. W.: Pulsion Diverticulum of the Hypopharynx at the Pharyngoesophageal Junction. *Surgery*, 1945, 18: 66.

In a series of 140 cases of pharyngoesophageal pulsion diverticulum, 107 of the patients were men and 33 were women. Their ages varied from 34 to 80 years, the average age being 57 years. In 80 per cent of the cases the symptoms were vague at onset and slowly progressive; in 20 per cent they were more rapid in progress. The duration of symptoms was from 1 to 25 years, the average duration before operation being about 5 years. Fifteen patients had marked obstruction of the esophagus and 3 had complete obstruction at the time of admission.

The earliest symptom usually is dysphagia. Later, food and mucus are regurgitated. After the sac has become well developed, its enlargement is more rapid than before because of the increased pressure from within, caused by retention of food and secre-

tions. Progressive esophageal obstruction often occurs and the patient's loss of weight may be great.

When a large sac that extends into the mediastinum is filled with food it produces marked pressure on the adjacent intrathoracic organs and causes a distressing sensation of fullness in the thorax, which often is associated with dyspnea, palpitation of the heart, and a sense of suffocation. Severe cough and choking spells frequently occur. Many times patients lower their heads, as is customary in postural drainage, and then press on the side of the neck in order to empty the sac. In some instances food may enter the trachea and cause marked cyanosis.

Repeated aspiration of food into the bronchi may result in bronchitis or bronchiectasis. In this series of 140 cases, bronchitis was present in 9 cases, and bronchiectasis in 4. Associated hoarseness of the voice also occurs. This is caused by pressure or inflammation around the recurrent laryngeal nerve, which is often close to the neck of the sac. In this series of cases, hoarseness was present in 8 cases; the vocal cord was fixed in 2 cases.

After the sac has become definitely formed, the symptoms are definite and characteristic. The diagnosis usually can be made on the basis of the symptoms, but it should be proved by roentgenographic examination. In the earlier stages when the symptoms are vague, a definite clinical diagnosis may not be possible without an esophagoscopic or roentgenological examination. These methods are the most accurate in the establishment of a definite diagnosis and the author believes they should be employed in all cases in which there are persistent signs of dysphagia. The longer the diagnosis is delayed, the greater is the risk of serious complications which may enhance the difficulties and may impair the results of surgical treatment.

Complete removal of the sac, including its neck, is generally accepted as the only effectual surgical procedure for pharyngoesophageal diverticulum. The technical difference in the two operative procedures advocated to accomplish this purpose is in treatment of the sac and the time of its removal. In the one-stage procedure the sac is removed at the primary operation. In the two-stage procedure a temporary diverticulopexy is performed and the sac is removed at a second operation seven to ten days later. The fundamental difference in these two procedures is that in the one-stage operation the fascial planes leading to the mediastinum are not walled off prior to removal of the diverticulum and in the two-stage operation the interval between the operations permits the formation of granulations which wall off the fascial planes of the neck and mediastinum. In this series of 140 cases, the one-stage operative procedure was performed in 115 cases and the two-stage procedure in 25 cases.

Patients who have lost considerable weight as a result of their inability to obtain sufficient nourishment require preoperative feeding. In most instances this can be accomplished by an indwelling stomach tube. Sixteen patients in this series of 140 cases were prepared for operation by this means. In one case in which complete obstruction was present it was impossible to pass the stomach tube, and a preliminary gastrostomy was necessary for feeding.

Dilatation of the introitus of the esophagus is advisable and has been performed routinely in the last 50 cases of this series. In many instances the introitus is distorted and dilatation minimizes the danger of exerting pressure at the site of closure of the pharynx when the patient swallows food postoperatively.

In all cases in which there is any evidence of retention in the diverticula, a roentgenological study of the thorax should be performed immediately before operation. The reason for this is to be certain that no barium has been retained in the diverticulum, which at operation might be aspirated into the lungs. In those cases in which retention exists, the diverticulum should be irrigated thoroughly to remove the contents.

The vocal cords should be checked both preoperatively and postoperatively. In any case in which the patient has symptoms of hoarseness it is advisable to check the vocal cords preoperatively.

A thread which is passed through the esophagus into the stomach the night before operation is left in place until the patient is taking nourishment satisfactorily after operation. This provides a guide over which a stomach tube can be passed if a postoperative pharyngeal fistula should develop. This, however, may be unnecessary since only one of the author's patients has required passage of a stomach tube postoperatively because of a pharyngeal fistula. Formerly the author left a stomach tube through the esophagus at the time of operation, but this practice was discontinued because the tube was often irritating to the esophagus and produced considerable mucus which may be detrimental to healing of the pharynx.

Operation should not be undertaken if the patient has had a recent infection of the throat or lungs, because of the danger associated not only with infection of the throat but also with cough postoperatively, both of which would interfere with the healing of the tissues.

The author prefers regional nerve block by the use of procaine. This method permits the patient's reflexes to remain active, which is a helpful safeguard in many instances. If an accumulation of secretions is present in the sac at operation, these secretions can be carefully emptied into the pharynx; they may be either aspirated by suction or swallowed. The act of swallowing is often helpful in identifying small diverticula, as air is forced into the sac. The surgeon also finds it helpful if the patient can talk during dissection around the neck of the sac posteriorly, because of the close proximity of the recurrent laryngeal nerve. This is true particularly in those cases in which, because of considerable inflammatory reaction around the neck of the sac and in the surrounding tissues, visualization of the nerve is difficult.

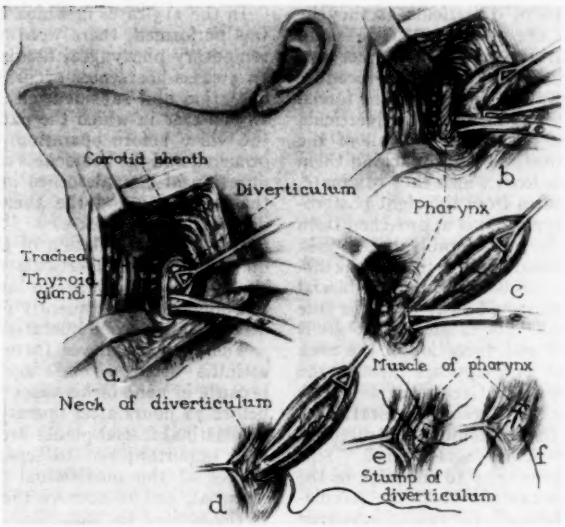


Fig. 1. One-stage diverticulectomy. a, Incision along anterior border of sternocleidomastoid muscle, retracting the thyroid medially and the carotid sheath with the sternocleidomastoid muscle laterally. The peritracheal fascia is incised at the level of the cricoid cartilage, to expose the diverticulum. b, Dissecting the diverticulum from the peritracheal fascia and elevating it from the fascial planes, starting at the neck of the sac. c, Dissecting the true neck of the sac from the surrounding muscles of the posterior wall of the pharynx. d, Transfixing and ligating the neck of the sac with chromic catgut. e, Invagination of stump of sac into wall of pharynx. f, Closing the opening in the muscles of the posterior wall of the pharynx with chromic catgut.

The method of approach to the diverticulum depends on its location but it should be from the side of the neck on which the diverticulum is situated. If the diverticulum originates in the midline, the author prefers a left cervical incision. Diverticula usually occur on the left side but in many instances occur on the right side. In this series of 140 cases, the approach was through the left cervical region in 116 cases and through the right cervical region in 24 cases. In one case an infected diverticulum was removed through the left cervical approach. The diverticulum subsequently recurred on the right side and the approach was through a right cervical incision.

The side of the neck from which to approach a diverticulum is determined by a careful study of the anteroposterior roentgenogram. In some instances in which determination of the exact position of the neck of the sac is difficult, esophagoscopic examination is of value.

In the one-stage procedure the incision is made through the skin and platysma myoides muscle, and along the anterior border of the sternocleidomastoid muscle from the hyoid bone above to a point about 2 cm. above the clavicle. The external jugular vein is often in the line of incision; in these instances the vein is cut and ligated. The sternocleidomastoid muscle then is separated from the omohyoid and sternothyroid muscles. The latter are retracted medially. This exposes the carotid sheath which, with the sternomastoid muscle, is retracted outward. The thyroid gland is exposed and retracted upward and medially; this exposes the peritracheal fascia which surrounds the trachea and esophagus. If appreciable hypertrophy of the thyroid gland is present, partial lobectomy may be necessary in order to obtain adequate exposure of the fascial coverings of the diverticulum. In many instances, particularly if the diverticulum is approached from the right side, the inferior thyroid artery and vein course over the diverticulum, and in these cases the vessels should be cut and ligated. The fascia then is incised posterior to the trachea at about the level of the cricoid cartilage. The neck of the diverticulum usually is located readily at a point opposite the level of the cricoid cartilage.

Several methods, such as the use of bougies and the esophagoscope, have been suggested for locating the diverticulum, but the author has not found these methods necessary. There is never any difficulty in

locating the larger types of diverticula as they lie lateral or posterior to the esophagus. The small diverticula, which often are buried in the cervical fascia, can be located readily by the simple procedure of having the patient swallow, or air may be forced into the diverticulum. The location of diverticula that occur through the posterolateral wall of the pharynx is greatly facilitated by approaching them from the side of the neck from which they originate. If a diverticulum originates from the right posterolateral wall of the pharynx and is approached from the left side, there may be considerable difficulty in locating it as well as in visualizing the neck of the sac.

After the diverticulum has been located, the fascial coverings are carefully dissected away until the true wall of the sac is reached. The fundus of the sac is elevated into the wound and dissection of the neck of the sac is carried out as it appears through the muscular wall of the pharynx. Great care should be exercised in this dissection to avoid perforation of the sac or injury of the surrounding structures, particularly the recurrent laryngeal nerve. This nerve is often in close proximity to the neck of the sac, particularly in those cases in which the sacculation passes through or beneath the cricopharyngeus muscles. It is important not to separate the fascial planes more than necessary to remove the body of the sac, particularly when the diverticulum extends into the mediastinum.

After the sac has been completely dissected free from the surrounding structures, the true neck of the sac is dissected from the pharyngeal muscles. Particular care is taken to separate and remove any fibers of the inferior constrictor muscle and of the cricopharyngeus muscle above and beneath the neck of the sac, respectively. In many of the larger diverticula, the opening into the pharynx is large and consists essentially of diffuse bulging of the back wall of the pharynx. In this type, great care should be exerted to determine the true relationship of the opening of the sac to the muscular wall of the pharynx, which often is much thinned out. It is important to dissect these diffuse sacculations from the muscle and to establish as small a neck to the sac as possible, with care not to remove too much of the mucous membrane because of the danger of producing a stricture. After the true neck of the sacculation has been isolated from the surrounding muscles, it is transfixed by the use of chromic catgut and the diverticulum is completely excised. The stump of the sac is then invaginated into the wall of the pharynx and the muscles of the wall which surrounded the neck of the sac are closed with interrupted catgut sutures. The silk thread which is through the esophagus is pulled taut by the anesthetist before the neck of the sac is ligated so that there is no danger of including it in the closure of the neck of the sac. A soft rubber tissue drain is placed in the pocket formerly occupied by the diverticulum but it is not placed at the site of closure of the pharyngeal wall. The wound is closed by the use of interrupted sutures.

In the 115 cases in which the one-stage operation was performed, there were no operative deaths. A temporary pharyngeal fistula developed in 5 cases. In 3 cases hoarseness occurred in 2 to 3 days after operation and subsided within 1 week or 10 days. In one case in which the patient had hoarseness of the voice before operation, paralysis of the cord occurred and the hoarseness continued. The average duration of convalescence in the hospital was less than 2 weeks and the average period of time to dismissal was 3 weeks.

In 5 cases angulation of the esophagus required dilatation. The diverticula recurred in 2 cases; in one of these the symptoms improved after dilatation but operation subsequently may be required. In the other case, a second operation was necessary.

The author believes there is little risk of mediastinitis after a one-stage operative procedure because in none of his cases has a fistula developed before 72 hours after operation. By that time the mediastinal fascial planes are walled off. However, it is important not to separate any more of the tissues of the mediastinal fascial planes than is essential, and to remove the diverticulum starting at the neck of the sac.

Fifteen of the 115 patients in this series had large diverticula that filled the entire mediastinum. In several instances they extended into the thoracic cavity. The largest one held 825 c.c. of fluid. There was no suggestion of mediastinal infection after operation in any of these cases.

The results of operation in the 25 cases in which a two-stage operation was performed were as follows: There was 1 operative death in the case of a patient who had Parkinson's disease. Although this death was attributed to the operation, it was the result of his poor general condition; the latter was caused by weight loss as a result of his inability to take nourishment because of the diverticulum, as well as advanced Parkinson's disease. A temporary fistula developed in 6 cases. In 3 cases there was temporary hoarseness and in 1 case there was paralysis of one vocal cord. The average convalescence before dismissal from the hospital was more than 5 weeks.

Five patients had angulations that required subsequent dilatations. There were 3 recurrences, all of which were treated by dilatation. Two patients subsequently may require surgery.

Neel, H. B., and Pemberton, J. D.: Lateral Cervical (Branchial) Cysts and Fistulas. *Surgery*, 1945, 18: 267.

Congenital cysts and fistulas which appear on the lateral aspects of the neck are referred to as branchial, vestigial, and lateral cervical. There is no unanimity of opinion as to the etiology of these lesions. The work and theory of Wenglowski, however, have greatly influenced thought on this subject.

Several members of the same family, and of one or more generations, may be afflicted. Other congenital lesions also are encountered occasionally in patients with lateral cervical cysts and fistulas.

A study was made of 319 cases in which operation was performed for lateral cervical cysts or fistulas at the Mayo Clinic. Specimens for pathological study or data on pathological findings were available in all cases. Detailed microscopic studies of specimens were made in 287 cases. Painless swelling was the most frequent symptom. In 61 cases the lesions were preceded by, or associated with, infections of the upper respiratory tract. Symptoms not infrequently appeared following tonsillectomy.

In this series, patients of both sexes were affected equally. The ages of the patients varied from 4 months to 84 years. The greatest number of patients (37 per cent) were in the third decade. The two sides of the neck were involved approximately equally. The lesions were bilateral in 2 per cent of the cases.

In the great majority of cases the lateral cervical cyst was located in the upper cervical region near the angle of the jaw.

In the complete and internal fistulas the internal opening usually is in the supratonsillar fossa. It is difficult to demonstrate clinically.

Lateral cervical cysts and fistulas must be distinguished from other lesions, especially tuberculous lymph nodes.

These lesions have a distinct pathology and microscopic examination is essential. The diagnosis of branchial carcinoma is probably erroneous. The lesion designated as "branchial carcinoma" is probably secondary to a healed or undiscovered primary lesion in the nasopharynx.

Conservative treatment is indicated in the presence of acute inflammation. Complete excision of the cyst or fistulas is the treatment of choice in the great majority of cases. In experienced hands the operative mortality is low.

Figi, F. A., Broders, A. C., and Havens, F. Z.: Plasma-Cell Tumors of the Upper Part of the Respiratory Tract. *Ann. Otol. Rhinol.*, 1945, 54: 283.

This report is based on a study of 11 cases of solitary plasma-cell myeloma of the upper part of the respiratory tract which were observed at the Mayo Clinic from January 1, 1930 to December 31, 1943, inclusive. Seven of the patients were males and 4 were females. Their ages ranged from 37 to 71 years. All but one of the patients were more than 40 years of age. In the present series of cases, the site of the tumor was as follows: in the maxillary sinus in 6 cases, in the oropharynx in 2 cases, in the nasopharynx in 2 cases, and in the larynx in 1 case. In both cases in which the oropharynx was involved, the tumor had originated in the right tonsil. In one of the cases in which the tumor involved the nasopharynx, the tumor had originated in the sella turcica or in the sphenoid sinus and had involved the nasopharynx secondarily. In some cases in which the lymph nodes were involved, a question arose as to whether the tumor had originated in these structures or had extended into them secondarily.

In cases of plasmocytoma of the upper part of the respiratory tract, the history varies greatly, according to the situation of the lesion and its activity. In most instances, symptoms have been present for less than 6 months, but they may have been noted for a year or more. The most common symptoms that the authors have encountered are swelling of the cheek, nasal obstruction, and frontal headache. In most of the cases in which the condition is primary in the mouth or pharynx, the patients are aware of the presence of a tumor and some of them experience difficulty in swallowing. In one case, a mass had been noted in the neck externally as well as inside of the pharynx. In cases in which the tumor is primary in the accessory nasal sinuses, most often in the maxillary sinus, the symptoms are localized pain, headache, swelling and soreness of the cheek and upper jaw, nasal obstruction, diplopia, and exophthalmos. In some of these cases teeth have been extracted because of the swelling of the alveolus and a sinus has persisted at this site.

The general appearance of patients with tumors of this type has varied with the stage of the disease. Some of them were in good general health and showed no evidence of systemic effects of the neoplasm. Others had the cachexia, anemia, weakness, and disability usually associated with an advanced malignant tumor.

Physical examination in these cases generally has revealed a tumor that appeared highly malignant, which was in keeping with the usual short duration of the symptoms. In a few instances the mass has had a polypoid appearance. Ulceration usually has not been present except after previous treatment. In all of the cases in which there was primary involvement of the maxillary sinus, the findings were indicative of a malignant neoplasm. Bulging of the palate, alveolus, cheek, and lateral wall of the nose, complete density of the maxillary sinus on transillumination, and elevation and, at times, proptosis of the eye were present. In 2 instances the tumor was on the point of perforating the skin of the cheek. Ulceration of the alveolus or palate was present in the cases in which dental extraction or other operative procedures had been carried out.

In one case in which the tumor had originated either in the sella turcica or in the sphenoid sinus, a sessile mass protruded from the vault of the nasopharynx and almost completely blocked both choanae. In another case a symptomless pedunculated tumor, 2.5 cm. in diameter, was attached to the right side of the posterior wall of the nasopharynx.

Clinical evidence of involvement of the regional lymph nodes was noted in only one of the cases in this series. In this case, the tumor, which originated in the right tonsil, had an ulcerated polypoid appearance and measured 3 by 2.5 by 2.5 cm., while the metastatic involvement of the lymph nodes in the right cervical region was 4 cm. in diameter.

Roentgenographic studies of the bony structures of the involved region and of the thorax were made in all of these cases. In cases in which the neoplasm

involved the accessory sinuses, the roentgenographic examination frequently showed much more extensive involvement than was suspected from the clinical findings. In several instances a tumor that appeared clinically to involve only the maxillary sinus and nasal fossa was found by roentgenographic examination to be present in the ethmoid cells and frontal sinus as well. In this group, too, malignant destruction of the floor and walls of the maxillary sinus, ethmoid cells, orbit, nose, and zygoma was evident at times. In one case in which a nonulcerated tumor protruded from the vault of the nasopharynx, roentgenograms showed extensive destruction of the sella turcica and cloudiness of the sphenoid sinus, which revealed that either of these regions was the site of origin of the neoplasm. Roentgenograms of the thorax were normal in all of the patients at the original examination at the clinic.

Only in one of the 11 cases was metastatic involvement of bone demonstrable roentgenographically at the time of the primary examination at the clinic. This was a case of a huge, rapidly recurring tumor of the upper jaw, maxillary sinus, ethmoid cells, and nasal fossa. Roentgenographic examination of the maxillary sinus disclosed not only extensive destruction of the upper jaw, maxillary sinus, and ethmoid cells but what appeared to be multiple areas of metastatic destruction throughout the skull as well. The patient had no symptoms referable to the secondary tumors. The metastatic involvement might well have furnished a clue to the nature of the lesion had the patient been observed prior to partial removal of the neoplasm of the superior maxilla and cheek. The trauma attendant on this therapy had produced extensive sloughing and inflammatory reaction so that the condition strongly suggested a fulminating type of squamous-cell carcinoma. Although the tumor of the upper jaw and maxillary sinus had been noticed by the patient for only three months, it was assumed that the malignant process was primary in this situation and that the smaller deposits observed throughout the calvarium were secondary.

SURGERY OF THE NERVOUS SYSTEM

PERIPHERAL NERVES

White, J. C.: Pain following Injuries of the Peripheral Nerves. *U. S. Nav. M. Bull.*, 1945, 45: 845.

The problems outlined in this article have occurred innumerable times during the present conflict, and neurosurgeons and neurologists have had ample opportunity to study and evaluate them; yet there is still no complete unity of opinion with regard to the underlying mechanisms. Painful stimuli may be due to faulty regeneration, sepsis, and scar-tissue formation, although anoxia plays an important role. Anoxia may be due to local scarring or widespread vasoconstriction. Vasoconstriction is particularly liable to play a part in emotionally unstable persons with vasospasm. Direct cross stimulation of sensory nerve fibers by efferent sympathetic impulses is a theory which deserves careful consideration. There are two types of intractable pain commonly associated with peripheral nerve injuries, the phantom limb pain and the causalgic pain. The phantom limb pain often shows psychic manifestations in that it may come and go with the patient's frustrations and achievements.

The treatment of pain in peripheral nerve injuries is satisfactory and more or less straightforward, and it is clearly shown that certain outmoded methods are to be avoided. These methods include reamputation, chemical blocking of nerve trunks at gradually ascending levels, repeated resection of neuromas, periarterial sympathectomy, subarachnoid injection of alcohol, and posterior root section. There are two procedures which have proved to be of value, the first for painful neuroma, and the second for causalgic states. A painful neuroma may be resected once if the pain is localized and if the pain is relieved by procaine block. At operation there are three ways of dealing with the neuroma: (1) the injection of 20 per cent formalin into the stump, (2) pulling the nerve through a drill hole in a neighboring bone, and (3) wrapping the nerve in a cuff of tantalum foil.

In the causalgic states, the diagnostic test is paravertebral procaine block, and, in the event that the pain is relieved during the period of the block, good results may be expected from appropriate sympathectomy. Sympathectomy, however, is more effective when pain is principally in the peripheral part of the limb.

There are cases of phantom limb in which the relatively harmless procedures described are not satisfactory and recourse must be had to operations on the central nervous system. There is no unanimity of opinions about the efficacy of these. Cordotomy and either postcentral cortical resection or lobotomy are possible methods of attack. With regard to cordotomy, a diagnostic test can be done by using spinal anesthesia for the lower extremity, and brachial plexus block for the upper extremity. A more careful preliminary use of these diagnostic tests will increase the satisfactory results following cordotomy. In cases in which the pain is definitely of central origin, resection of the postcentral cortex appropriate to the involved area of pain may give relief by removing the sensory cells which give rise to the phantom sensation; lobotomy or interruption of the frontal association fibers may remove the patient's introspection and concentration on his defect.

ADRIEN VERBRUGGHEN, M.D.

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Clarkson, P., and Schorstein, J.: The Treatment of Denuded Skull Table. *Brit. M. J.*, 1945 2: 422.

The treatment of widely denuded areas of the calvarium has usually required a lengthy period of hospitalization and care because healthy granulation tissue must grow from the diploic spaces after numerous burr holes are placed through the external table.

The authors present a technique of early skin grafting which had been used in 3 cases with complete loss of scalp and pericranium over the area. Burr holes were placed only through the outer table, arranged in a mosaic pattern, and connected with grooves produced with a gauge. The outer table was then chiseled away in small blocks to expose the entire diploe of the denuded area. Hemostasis was obtained with hot packs; however, bone wax was used in 1 case without detriment. Thin patch grafts, 1 cm. square, were then placed directly upon the diploe, covered by a nonadherent material, and maintained in place by tulle gras, wool, or crepe. The dressings were removed on the fourth day and then changed daily until healing ensued. Good results were obtained in all 3 cases. JACK I. WOOLF, M.D.

Wachowski, T. J., and Chenault, H.: Degenerative Effects of Large Doses of Roentgen Rays on the Human Brain. *Radiology*, 1945, 45: 227.

The authors have reviewed the literature from the standpoint of the effects of roentgen rays on the human brain. There is a good deal of evidence to indicate that large doses of roentgen rays produced definite degenerative changes in the brain. These degenerative changes in some instances were reported in association with an increase of lipochrome substance within the cells. The nerve cells were affected most, and the neuroglia to a lesser extent. The blood vessels for the most part seemed unaffected. Such changes were reported following the use of 12,645 r. (air) through multiple portals over a period of 5 months.

More marked degenerative changes following even larger doses included alterations in the astrocytes, microglia, and possibly the oligodendroglia.

The authors have reported on 6 patients, in 4 of whom the tumors were histologically verified prior to irradiation. Treatment consisted of the use of from 3 to 5 portals, with an initial dose of 150 r. increased over a few days to 300 r. The shorter series ran 32 days, totaling 9,000 r. (air) and 6,150 r. tumor dose; the longer series took 106 days, with 14,840 r. (air) and 8,809 r. tumor dose.

Three of the cases came to autopsy, and these showed extensive degenerative changes in the nerve tissue.

Pathological studies reported by the authors indicate that following irradiation of the brain there are widespread changes which affect all the cellular elements. The nerve cells of the cerebral cortex are almost universally degenerated, the least change being seen in the large Betz cells of the motor cortex. The neuroglial cells, especially the protoplasmic cells of the cortex, are fragmented, and the fibrillary neuroglial cells are swollen. Fat has accumulated in their cytoplasm.

There is an increase in the number of microglia cells of huge size, with their processes laden with fat or greenish pigment. The capillaries and other small blood vessels have excessive amounts of fat in the endothelial and adventitial cells. The myelin sheaths are swollen and fragmented, giving rise to accumulations of fat in the white substances. The nerve fibers are also swollen and fragmented. In the adventitial spaces are accumulations of lymphocytes, plasma cells, and macrophages. There is, therefore, a degenerative change affecting all parts of the brain and all its cellular elements, even of the cerebellum.

HOWARD A. BROWN, M.D.

O'Connell, J. E. A.: Lumbar Puncture in the Treatment of Penetrating Wounds of the Brain. *Lancet*, Lond., 1945, 249: 389.

The dangers of lumbar puncture in intracranial hypertension have been amply set forth, but the value of this procedure for control has rarely been given a great deal of consideration. Although most neurosurgeons use spinal puncture in head injuries, the specific theory and indications have not been the subject of a special discussion. Penetrating wounds of the head provide material from which such a discussion may be launched. Of over 1,000 head injuries dealt with, in the post hospital where the author was stationed, 150 were penetrating wounds. Various conditions arise in which lumbar puncture may be of service, namely, in postoperative reduction of cerebral pressure in scalp wounds with penetration, in removal of intracerebral foreign bodies, in post-traumatic cerebral abscess, in untreated wounds seen after infection has set in, and in the treatment of progressive cerebral fungation.

There may be sufficient pressure from cerebral herniation on a scalp wound to cause anxiety about the strength of the suture line. When primary healing has taken place, the danger of cerebral fungus is passed and that anxiety need no longer be entertained. During the period of healing, lumbar puncture will be found of value to reduce pressure on the wound. Cerebral herniation may have occurred before the patient is available for treatment and the brain wound may contain various bone and metallic fragments which are inaccessible, partly because of the herniation. The track containing foreign bodies may be compressed in the herniated brain tissue. Lumbar puncture under these circumstances will reduce the herniation and open up the track of indriven fragments, which makes their essential complete removal much easier. The puncture is done immediately before the débridement is begun. Very much the same situation exists when a post-traumatic abscess has formed and the sinus track is compressed in a cerebral herniation. Lumbar puncture immediately before operation will open up the track and facilitate drainage and packing of the abscess cavity. The author packs such a cavity with rubber sheeting in which strip gauze is inserted, forming a tampon which provides drainage outside of the rubber. The sheeting is changed frequently following lumbar puncture. Penicillin is used locally.

A patient with a penetrating wound may be considered too ill for surgery when first seen and, later, after a few days survival, his untreated wound may be infected. Such a patient is almost certain to have a cerebral herniation through a dural defect. Lumbar puncture may be used to open up the track, which facilitates cleansing the wound and dressing it with a rubber sheeting tampon.

Progressive cerebral fungation is an obstinate and difficult complication of a latge penetrating wound of the head. In this case the herniation may contain part of one of the lateral ventricles. The dilating distorted ventricle may, in fact, be the cause of the herniation. Lumbar puncture, diligently used, may cause the withdrawal of the herniation and ventricle into the cranial cavity.

In the cases under discussion, the lumbar puncture was done under anesthesia immediately before operation and the level to which the intracranial pressure was lowered depended on the circumstances of the case. After operation puncture was done once a day, the patient's head was kept high, and his fluid intake was regulated. Puncture was not done in cases in which the wound was thought to involve the lateral ventricle for fear of aspirating foreign material into it. Apart from the considerations mentioned, lumbar puncture was of value in diagnosis and as a route for the introduction of penicillin. This excellent article is well illustrated and documented with case reports.

ADRIEN VERBRUGGHEN, M.D.

Martin, H., and Reese, A. B.: Treatment of Bilateral Retinoblastoma (Retinal Glioma) Surgically and by Irradiation; Report on Progress. *Arch. Ophth.*, Chic., 1945, 33: 429.

The authors have made a special study of bilateral retinoblastoma and have offered 2 previous reports, one in 1936 with a discussion of 6 cases, and one in 1942 in which 4 new cases were added. This article

is a report of progress with regard both to the technique of treatment and examination and also the end-results of such treatment. Fourteen additional cases are discussed.

The five-year end-results in 9 cases treated surgically and by irradiation are of interest in that 6 of 8 patients who were treated prior to 1939 are still living. In 1 case, the cause of death may not have been connected with the original growth. Two of the 6 living patients can see and 4 cannot.

A comprehensive table showing the location, size of the tumor, treatment, and end-result in these 24 cases is appended. The first sign of the tumor is usually a white light reflex in the pupillary region of the eye; this may lead to examination and recognition of the disease, which is usually bilateral. Tumors that occupy more than one quadrant of the fundus have a poor prognosis. Raised, nodular tumors are unfavorable. Irradiation is relied upon to a great extent and the signs of improvement under this method are described; they consist chiefly of a gradual increase in the calcium content of the tumor to the point where it has the appearance of a single nodular mass of calcium resembling cottage cheese. The roentgen rays must be used with caution for the eye has a limited tolerance to them. The precise method to be used is described in detail, the single dose is about 400 roentgens, and the maximum total dose 8,000 roentgens × 2.

It is recommended that the child be frequently reexamined, and this is best done under light chloroform anesthesia. ADRIEN VERBRUGGHEN, M.D.

SPINAL CORD AND ITS COVERINGS

Nisenson, A., and Patterson, G. H.: Spinal Cord Tumors in Children; A Study of 3 Cases of Ependymoma. *J. Pediat.*, S. Louis, 1945, 27: 315.

Most medical men are of the opinion, after reading authoritative works on spinal-cord tumors, that these are rare in children. Among the older writers, however, there is evidence that these lesions occurred more frequently in children. In modern works the percentage varies from 1 to 5 per cent, but in older works it varies from 10 to 13 per cent.

The present article has to do with 3 cases of spinal-cord ependymomas in children; in 1 of these the result was very satisfactory in that the patient is still alive after three and one-half years. The diagnostic problem is the important one, for in all 3 of the cases reported, the preliminary diagnosis was incorrect and treatment was instituted without improvement. Tuberculosis and poliomyelitis were the entities mistaken for the spinal-cord tumor in these 3 cases. The history, however, should have given a clue, for in all of the cases the trouble commenced with pain and stiffness of the back and finally led to unmistakable symptoms. In all of the cases, the spinal fluid showed increased protein, xanthochromia, or complete block, and it is probable that the puncture should have been undertaken for diagnostic purposes at a much earlier date.

An examination of the roentgenograms of the spines showed that in all 3 there were definite changes of the pedicles, which, if properly assessed in the first place, would have at least suggested the true nature of the complaint.

The 3 case reports are submitted and are carefully documented; they should be found useful to those who are interested in this subject.

ADRIEN VERBRUGGHEN, M.D.

SYMPATHETIC NERVES

Zadikoff, I. J., and Grayce, I.: A Case of Carotid Sinus Syndrome Relieved By Operation. *Clin. Proc.*, Cape Town, 1945, 4: 253.

The carotid-sinus syndrome is one of the causes of syncope, and recently there has been a tendency to deal with this condition by non-surgical methods. This article contains a brief review of the pertinent literature on the subject and describes a case in which the patient was relieved by surgical measures.

Electrocardiographic changes were noted during pressure on the hypersensitive right carotid sinus of the patient. A bradycardia of 44 per minute was produced by pressure on the sinus and at least one asytole lasting 2½ seconds was recorded. No attempt was made to make preoperative tests with atropine or to novocainize the bifurcation of the common carotid artery. A periarterial sympathectomy was performed from 2 inches below the bifurcation to 2 inches above it, thus the three carotid vessels were stripped for at least 2 inches. The patient had no further attacks of syncope and pressure on the affected sinus did not result in any consequential changes 6 months after the operation.

The authors believe that surgical intervention has a distinct place in the treatment of this syndrome and that it must be considered in all cases of syncope. The diagnosis rests on the ability to reproduce the syndrome by pressure on the sensitive sinus.

ADRIEN VERBRUGGHEN, M.D.

Hines, E. A., Jr., and Christiansen, N. A.: Raynaud's Disease among Men. *J. Am. M. Ass.*, 1945, 129: 1.

The occurrence of Raynaud's disease in men is reported in a series of cases dating from January, 1940 to December, 1942, at the Mayo Clinic. The average incidence has been 21 per cent in males and 79 per cent in females. The authors stress the importance of accurate criteria in making the diagnosis of "Raynaud's disease."

Raynaud's phenomenon is described as the occurrence of intermittent episodes due to a functional vascular disturbance, either primary or secondary, resulting in color changes of the extremities—principally the fingers and toes, and less frequently the nose and ears. These episodes are initiated by exposure to cold, and less frequently by nervous or emotional strain and stress. When the condition is primary, it may be referred to as Raynaud's disease.

A working basis for the diagnosis of this condition has been set forth in a previous publication by Allen and Brown, and is summarized as follows:

1. Episodes of Raynaud's phenomenon excited by cold or emotion
2. Bilaterality of Raynaud's phenomenon
3. Absence of gangrene, or if it is present its limitation to minimal grades of cutaneous gangrene
4. Absence of any primary disease which might be causal, such as occlusive disease of the arteries, cervical rib, or organic disease involving the nervous system
5. Symptoms of 2 years' or longer duration

Symptoms in this series were reported as appearing as early as the age of 5 years, and as late as 63 years. In 91 per cent of the cases exhibiting Raynaud's phenomenon the symptoms were recorded as having been present for 2 years; in 59 per cent the symptoms were present for 6 years, and in 11 per cent they were present for 21 years or longer. The early establishment of a correct diagnosis of Raynaud's disease is emphasized; this condition is considered more benign than the more serious diseases which have Raynaud's phenomenon as a secondary manifestation, such as thromboangiitis obliterans, arteriosclerosis obliterans, and scleroderma.

The treatment depends upon the degree of incapacitation, and conservative therapy is recommended when the disease is not too incapacitating. The patient should avoid exposure to cold or sudden changes of temperature, and should use warm, protective clothing. The direct relationship of tobacco to this condition is not clear, but it is advised that patients with this condition abstain from the use of it.

Sympathectomy was done in 2 cases, with prompt relief.

A detailed study of 100 unselected cases among 181 male patients was made; further studies were conducted on 69, of whom 33 per cent, having had conservative treatment, showed improvement; 44 per cent were unchanged, and 23 per cent were worse.

HOWARD A. BROWN, M.D.

MISCELLANEOUS

Nadler, S. B.: Paroxysmal Headache. *J. Am. M. Ass.*, 1945, 129: 334.

Eight cases of paroxysmal temporal headache are reported; they were treated surgically. Characteristic attacks started with periodic throbbing pain in the right, left, or both temporal regions, radiating to the frontoparietal and postauricular areas. Gastrointestinal manifestations were frequent during the attacks.

Digital compression on the temporal artery on the affected side abolished the throbbing pain and the greater part of the continuous dull headache. The area in which digital compression afforded maximum relief was injected with 2 c.c. of 1 per cent procaine hydrochloride, and this afforded complete relief to the majority of the patients.

Ligation and section of the temporal artery was then performed under general anesthesia, with reported relief of headache varying from 2 to 11 months after operation at the time of this report.

HOWARD A. BROWN, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Schie, E.: On the Prognosis of the Papilloma of the Lactiferous Ducts. *Acta chir. scand.*, 1942, 87: 417.

There has been a very considerable disagreement among pathological anatomists as to whether papilloma of the lactiferous ducts is benign or malignant. Some authorities hold that as many as 50 per cent of these papillomas develop into cancer, while others maintain that it has never been proved that they represent precancerous conditions.

The only practical way to settle the question is to re-examine patients who have had papillomas of the lactiferous ducts and on whom only local extirpation of the tumors has been performed. With this object in view the author examined 53 patients on whom operation had been performed for this form of papilloma. Amputation of the breast had been performed in 26 of the cases, however, and these were not considered in his study. In the 27 other cases local extirpation had been performed. In 8 of these cases histological examination showed very marked atypia of the cells, while in the 19 others the cells were only moderately atypical. A number of microphotographs showing the histological findings are given. Re-examinations were made after from 2½ to 8 years and only 1 case showed a recurrence. This had appeared after 4½ years and was benign, the picture being that of papillomatous adenoma.

The author concludes, therefore, that it is not too great a risk to remove a papilloma of the lactiferous ducts by local extirpation. This spares an organ that is of great importance to the patient both physiologically and esthetically. It is advisable, however, to keep the patient under medical observation for a year or two after operation so that any recurrence may be detected early. AUDREY G. MORGAN, M.D.

TRACHEA, LUNGS, AND PLEURA

Gusterson, F. R.: Postoperative Chest Complications; Controlled Study in Hernia and Meniscectomy Operations. *Lancet*, Lond., 1945, 249: 431.

Two hundred soldiers were operated upon in a military hospital in the course of 2 years by practically standard procedures and under practically identical conditions—100 for hernia and the other 100, which were included in this study merely as controls, were subjected to meniscectomy. In each of these two groups 50 of the patients were given ether anesthesia and the other 50 were given gas-oxygen. For the ether the Oxford vaporizer was used, which admits of a light, uniform administration; the nitrous oxide and oxygen were administered in a closed circuit, no suboxygenation being allowed.

All patients were examined the day before operation, with special attention to the "smokers cough" reported by Morton (*Lancet*, Lond., 1944, 1: 368). When the subjects had a history of recent coryza, they were not operated upon for at least a week after the symptoms had subsided. Those with a history of chronic bronchitis with sputum or with any chronic respiratory disease, such as mild emphysema, were all classed as having major preoperative respiratory complications, even though there were no signs of active disease. Early exercises were insisted upon and the stay in bed was 14 days in all cases. During the first 7 days the temperatures were recorded every four hours. The number of times a patient vomited was recorded by observation, not by the patient's statements.

It was found that following herniorrhaphy, temperatures from 99°F. to 101°F., inclusive, developed in 14, 21, and 7 cases done under ether anesthesia, and in 15, 22, and 6 cases done under gas-oxygen anesthesia. Eight of the patients operated upon under ether and 7 under gas-oxygen developed temperatures of over 101°F. Of the patients subjected to meniscectomy, none developed a temperature of more than 101°F; 5 under ether anesthesia, but none under gas-oxygen, developed temperatures of 101°F. Twenty-three under ether and 28 under gas-oxygen developed temperatures of 100°F., and 22 each under ether and under gas-oxygen had temperatures of 99°F.

Thus, it was found that in neither series was the incidence of chest complications any higher whether ether or gas-oxygen anesthesia was used. There was a higher incidence of preoperative chest complications (43 minor, 7 major) in the hernia series than in the meniscectomies (15 minor, 2 major); the number of cases developing major chest conditions was roughly doubled following herniorrhaphy, irrespective of the anesthetic agent, which suggested a distinct liability to postoperative chest complications in the cases of hernia. However, in no case were the full classical signs of lobar atelectasis found, perhaps because treatment (see original article) was instituted at once. The presence of such a high incidence of preoperative chest complications in cases suggesting a liability to postoperative chest complications does, however, emphasize the need of a careful survey of each patient before operation, and the fact that reliance must be placed on very careful postoperative routine rather than on the choice of any particular technique of anesthesia, if the incidence of postoperative chest morbidity is to be reduced.

The incidence of postoperative vomiting was studied under the impression that patients who did not vomit were more liable to develop a chest condition, and the only postoperative difference which could be attributed to the anesthetic was found to

be a slightly higher incidence of postoperative vomiting after ether.

The author concludes from this study that the use of ether as an anesthetic does not increase the incidence of partial collapse of the lung or of any other chest complication following hernia operations, provided only the lightest necessary plane of anesthesia is maintained. JOHN W. BRENNAN, M.D.

Aronovitch, M.: Medical Treatment of Postoperative Pulmonary Atelectasis. *Canad. M. Ass. J.*, 1945, 53: 222.

Postoperative atelectasis is still the most important acute collapse of the lung which may occur. Its treatment properly consists in prevention. This entails proper preoperative hygiene of the nose and throat and the careful selection of cases for surgery. Very important, however, is the immediate postoperative care, which is usually administered by the anesthetist and usually consists of carbon dioxide inhalations and the aspiration of mucus from the nasopharynx, throat, and deeper structures if necessary.

In spite of all precautions pulmonary collapse will still occur in a certain proportion of cases. The immediate cause of the collapse is conceded to be a plug of mucus, or fibrin and mucus which seals one of the larger or smaller bronchi. The contributing factors to this event may be many, and accordingly various theories have been advanced to explain why this plug should occasionally occur.

No matter how the bronchial plug is formed, the result is the same. Air in the alveoli distal to the plug is absorbed and collapse of these alveoli occurs. The clinician is then confronted with a patient who exhibits the familiar picture of postoperative atelectasis with its fever, shallow respirations, cyanosis, and chest pain.

The problem is to remove the plug. Once this is gone the affected alveoli will usually re-expand and all symptoms disappear. Bronchoscopic aspiration can, of course, be done and must always remain as the final method of choice when others fail, but it is usually unnecessary to resort to this measure, which is in itself an operation.

Sometimes exceedingly simple procedures, such as a slap on the back, encouraging a hard coughing spell, or posturing the patient, will dislodge a bronchial plug. Often, however, these measures fail and in such cases a more detailed knowledge of the mechanics of the bronchial tree may aid in rational therapy.

Once the plug is firmly in the bronchus and atelectasis has occurred, it may be assumed that there is a great deal of spasm. Indeed it is this bronchial spasm which probably contributes greatly to the shallow respirations and cyanosis seen in these cases.

Bronchospasm is an important factor which must be considered and must be eliminated in any rational treatment.

Another important factor which must be considered is the dry viscid nature of the plug.

Two other factors must be considered. One is gravity, but a more important factor is the intrabronchial pressure proximal and distal to the plug. Atelectasis having taken place by absorption of the air distal to the plug, intrabronchial pressure and pressure from the surrounding structures will tend to drive the plug in deeper. An expulsive force to drive the plug out of the bronchus should therefore be considered.

An attempt can be made to remedy each of these factors and the resultant combined action is often successful in curing the atelectasis.

It is not expected that the plug itself, once formed, can be easily liquefied, but if the bronchial mucosa can be made to secrete a thin watery fluid this will surround the adherent plug, and the latter will then tend to float off. One-half ounce of mixture of ammonium chloride every 4 hours is helpful in achieving this objective.

The most powerful agent in relaxing the bronchial musculature is adrenaline. Ephedrine is satisfactory, however. Given hypodermically in a dosage of ½ gr., it has proved very efficacious. The bronchial dilator is best given some time after the expectorant so that bronchial secretion is already present. Twenty minutes or thereabouts should be allowed between the oral expectorant and the hypodermic bronchodilator, which is repeated every 4 hours.

Gravity and expulsive force can now be called in to aid in the expulsion of the plug by posturing the patient and encouraging him to cough for some 10 minutes after the bronchodilator is given; this is to be repeated hourly. This method will not succeed in all cases, but it is well worth a trial. If it fails and the patient has no relief after 24 hours, bronchoscopic aspiration can always be done. There is no risk in delaying bronchoscopic aspiration for this length of time even if the patient is somewhat uncomfortable, provided the possibility of lung suppuration can be minimized. Adequate prophylactic doses of sulfathiazole or sulfadiazine should, therefore, be given with this therapy.

Six cases are presented in which this method was employed at the Montreal Military Hospital with good results. JOHN E. KIRKPATRICK, M.D.

Kay, E. B., and Meade, R. H., Jr.: Penicillin in Infections of the Lungs and Bronchi. *J. Am. M. Ass.*, 1945, 129: 200.

Kay and Meade treated 93 patients having chronic infections of the lungs and bronchi with penicillin. Forty-five of these patients had bronchiectasis, 17 had lung abscesses, 6 had suppurative pneumonitis, 19 had chronic bronchitis, and 5 fungous infections.

Penicillin is of unparalleled value in the treatment of acute pulmonary infections, but as chronicity develops, it becomes less effective. Chronicity in pulmonary infections introduces factors not found during the acute stage, which influence the efficacy of penicillin therapy. They are the mechanical factors of tissue destruction, fibrosis, avascularity, and bronchial occlusion.

Penicillin appears to be of value in the treatment of acute exacerbations of chronic infections, superimposed attacks of bronchopneumonia, chronic bronchitis, minimal bronchiectasis, and advanced bronchiectasis too widespread for pulmonary resection. It is also of value in preparing the patient for operation; as an adjunct to surgery, making possible operative intervention otherwise impossible; and in decreasing the postoperative complications.

Penicillin is of no permanent value in the treatment of advanced bronchiectasis, nor should pulmonary resection be withheld when indicated because of the false sense of security resulting from temporary benefit.

In the treatment of pulmonary suppuration, chronic lung abscesses, and fungous infections the chief value of penicillin is its ability to decrease the general manifestations of toxicity, to promote symptomatic improvement, and to prepare the patient for operative intervention.

The intratracheal administration of penicillin in the treatment of chronic bronchitis and bronchiectasis appeared to give more benefit in many cases than intramuscular administration. As much as from 30,000 to 50,000 Oxford units of penicillin can be applied daily in one application to the tracheobronchial tree. Excellent results were obtained in patients with chronic bronchitis and minimal bronchiectasis by the use of this method.

STEPHEN A. ZIEMAN, M.D.

Randolph, V. S.: The Drainage of Cavities in Bilateral Pulmonary Tuberculosis. *J. Thorac. Surg.*, 1945, 14: 395.

In bilateral pulmonary tuberculosis, the treatment of cavities is often the most serious problem, and it is frequently insurmountable. Many patients with bilateral disease have been successfully treated with bilateral artificial pneumothorax. It is often necessary to sever adhesions on one or both sides of the chest in order to make the collapse successful.

When pneumothorax cannot be used because of too extensive adhesions, it is necessary, when considering other forms of collapse, to study the patient from the standpoint of preserving adequate lung space. In the treatment of cavities at or very near the apex, bilateral extrapleural pneumolysis and extrapleural pneumothorax have rarely been employed successfully. In exceptional cases, in which sufficient lung space may be saved, bilateral thoracoplasty has been employed.

However, if the cavity to be treated lies in the lower part of the upper lobe, a middle lobe, or the upper part of the lower lobe, these collapse methods are not available, because collapsing the cavity will also collapse too much useful lung. In these cases, some type of cavity drainage must be used. Open drainage of tuberculous cavities has ordinarily been disastrous, but by the use of closed catheter drainage, many cavity closures have been reported; however, in many cases, there has been a reopening of the cavities after the original closure.

In 2 cases of bilateral pulmonary tuberculosis, which were not suitable for any form of collapse therapy, the Eloesser-flap drainage was used. In both cases the results were excellent. The field of this operation is definitely limited. It has hitherto been used on only one side of the chest when it has been possible to control the tuberculosis on the other side. However it may be of value for use on both sides of the chest. This form of drainage has the advantage of being a simple procedure and one which does not require close continuous aftercare.

SAMUEL KAHN, M.D.

Thomas, J. W., Van Ordstrand, H. S., and Tomlinson, C.: The Treatment of Bronchiectasis with Chemotherapy and Allergy Management. *Ann. Int. M.*, 1945, 23: 405.

An evaluation by follow-up examination and questionnaires was made of 75 cases of bronchiectasis treated by sulfonamides and/or allergic management. In 13 of these cases, operations had been recommended but they had been refused or postponed; the remaining cases had been considered nonsurgical because of minimal or advanced disease, age, and general conditions. The periods of observation varied from 4 months to 5 years, the majority of the cases being observed for 2 years at least; most of the patients had had the disease 5 years or longer.

In 57 cases, lipiodol bronchography and bronchoscopy established the diagnosis, while in the remainder of the cases the diagnosis was made by means of the history, physical examination, absence of tubercle bacilli and fungi in the sputum, and stereoscopic and plain chest films (which are at best only suggestive evidence). In one-half of the cases the nonhemolytic streptococcus, streptococcus viridans, and the hemolytic streptococcus were found; one-fourth showed the pneumococcus; and some showed the fusiform bacillus, spirochaeta, neisseria catarrhalis, staphylococcus albus, and haemophilus influenzae. Fifty-five of the patients had associated major respiratory allergy, including bronchial asthma, perennial allergic bronchitis, and severe perennial allergic rhinitis.

Treatment consisted of palliative measures to reduce pulmonary infection to a minimum and to irradicate obstruction, i.e., treatment of sinusitis and oral sepsis, rest, adequate diet and vitamins, and postural drainage. Sulfonadiazine or sulfathiazole was used in most instances; the average courses were 7.7 gr. (0.5 gm.) four times daily for 4 weeks, repeated from 0 to 9 times at intervals of from three to four months. Allergy management consisted of thorough investigation and avoidance of important offending allergens in the patients, environment, dietary restrictions, hyposensitization with extracts, and autogenous vaccinations. These measures were followed for periods varying from 4 months to 3½ years.

The summary reveals the following results, in addition to the preceding facts:

1. Twenty-three cases received sulfonamide drugs as the chief or only therapeutic measure. Twenty-two of these showed definite improvement with reduction of cough and expectoration while under treatment.

2. Twenty-one cases were treated chiefly or wholly with allergy management. Fifteen of this group showed frank improvement with reduction in cough and expectoration.

3. In 31 cases combined allergy and sulfonamide therapy was used. Twenty-six showed at least from 25 to 100 per cent improvement in cough and expectoration.

4. Recurrences of symptoms of original severity were frequently noted following acute respiratory infections, cessation of allergy management, or in some cases when infrequent courses of sulfonamide drugs were used. JAY BARTLETT, M.D.

Tinney, W. S., and McDonald, J. R.: Pulmonary Metastasis of Carcinoma Diagnosed by Bronchoscopy. *Minnesota M.*, 1945, 28: 554.

In 3 cases a metastatic lesion from carcinoma ulcerated through some portion of the tracheobronchial mucosa. The first case was probably an example of direct invasion of the trachea by carcinoma of the thyroid and the second case was an example of carcinoma of the breast with metastasis to the bronchial mucosa.

The third case was the most interesting one in this series. The metastatic lesion in the lung was diagnosed 2 years after nephrectomy for hypernephroma and there was no evidence of recurrence or metastasis 4 years after pneumonectomy for the metastatic tumor.

In all of these cases, metastasis to the tracheobronchial tree was diagnosed on bronchoscopic examination and biopsy of tissue obtained bronchoscopically confirmed the diagnosis.

Griess, D. F., McDonald, J. R., and Clagett, O. T.: The Proximal Extension of Carcinoma of the Lung in the Bronchial Wall. *J. Thorac. Surg.*, 1945, 14: 362.

This study was based on 55 cases of carcinoma of the lung in which the surgical specimens were examined microscopically to determine the proximal extension of the malignant lesion along the bronchial wall. Only 30 of the 55 cases were included in the final survey. In the remaining 25 cases, the specimens had been mutilated by previous investigation or the carcinoma obviously did not involve a bronchus. The following types of tumor were encountered in the 30 cases: a squamous cell epithelioma in 16, or 53 per cent; an adenocarcinoma in 6, or 20 per cent; an adenoma in 7, or 23 per cent, and an anaplastic type of carcinoma in 1 case, or 3 per cent, respectively.

Although adenocarcinomas are considered more malignant than are squamous cell epitheliomas, the tumor had extended proximally in 10, or 62 percent, of the 16 cases of squamous cell epithelioma as compared with 3, or 50 per cent, of the 6 cases of adenocarcinoma. The adenocarcinomas, however, extended a greater average distance proximally than did the squamous cell epitheliomas. Of the 16 squamous epitheliomas, 5 were grade 2 and 11 were grade 3. Of the 6 adenocarcinomas, 1 was grade 2, 4 were grade 3, and 1 was grade 4. Proximal extension did not occur in the case in which the adenocarcinoma was grade 4. This is in agreement with the finding of New and Fletcher in cases of carcinoma of the larynx, and with that of Conway and Broders in cases of carcinoma of the urinary bladder; namely, that carcinomas that are of grade 4 are not as prone to spread by direct extension as are those of grade 3.

There was no evidence of extension in the 7 cases of adenoma or in the case in which an anaplastic type of carcinoma was encountered.

In 8 cases extension occurred in the outer fibrous coat only; in 3, it occurred in the mucosal coat only; in 1 case, it occurred in the submucosa, and in 1, it occurred in both the submucosa and the outer fibrous coat.

When dealing with adenocarcinomas the surgeon should, if anatomically possible, sever the bronchus more than 2 cm. proximal from the gross limits of the lesion. If the tumor is a squamous cell epithelioma, a safe distance to sever the bronchus would be at least 1.5 cm.

Neuhof, H., and Stats, D.: Putrid Empyema without Foul Sputum. *Surgery*, 1945, 18: 411.

The diagnosis of putrid empyema in the absence of foul sputum or other evidence of a pulmonary abscess is difficult. The lesion should be suspected and efforts at diagnosis should continue as long as a given set of clinical manifestations are present. These consist primarily of outstanding and persistent chest pain, slight cough and expectoration, and an illness which is severe at least in the initial stage. Cough may be absent; the course may be chronic. The discovery of foul pus by aspiration of the pleura is the sole method of establishing the diagnosis. This disclosure will often be a surprise. Wide drainage of the main lesion and its ramifications will effect a cure unless the diagnosis has been delayed too long. Although a pulmonary abscess is not demonstrable, a putrid pulmonary abscess is the precursor of "surprise" putrid empyema.

STEPHEN A. ZIEMAN, M.D.

Collis, J. L., Davison, M. H. A., and Smith, P. S.: The Management of Traumatic Pyothorax. *Lancet*, Lond., 1945, 248: 778.

The 44 cases on which this article is based are instances of total or almost total pythorax and do not include patients with early infected hemothorax. The high mortality of 27 per cent (12 cases) emphasizes the importance of this condition. The authors' experience has led them to believe that a localized empyema is sometimes unavoidable, but that total pyothorax, with the possible exception of cases associated with esophageal injury or very virulent

organisms such as the hemolytic clostridium welchii, is an avoidable condition. In other words, if pulmonary expansion is effected and maintained from the onset of treatment, infection can produce only a localized empyema.

In cases of closed pyothorax, aspiration is carried out for the first few days, penicillin being introduced into the pleura after aspiration on alternate days. The aspirations may be necessary daily or on alternate days, according to the rate of collection of fluid, and are followed every forty-eight hours by the introduction into the pleural cavity of 50,000 units of penicillin in 2 c.c. of water. At the last aspiration before drainage, 20 c.c. of iodized poppyseed oil is introduced, and posteroanterior and lateral roentgenograms are taken. A portion of the ninth or tenth rib is then resected, all clot removed, and drainage instituted just under the lateral edge of the erector spinae. Breathing exercises are started at once. The incision is vertical for two reasons. The first is that it heals better this way; if a horizontal incision is made serous fluid or pus can collect under the lower edge, but if the incision is vertical outward drainage takes place more readily along the line of the incision. The second reason is that after a vertical incision is made it is easy to resect a portion of the rib one higher or lower if the first rib resection is found to be unsuitably placed. Although local anesthesia was used at first for these operations it has been given up in favor of cyclopropane.

A method of two-tube drainage, with an additional apical tube, allows the cavity to be washed out and prevents the drain from becoming blocked.

JOSEPH K. NARAT, M.D.

Hirshfeld, J. W., Buggs, C. W., Abbott, W. E., and Pilling, M. A.: Penicillin in the Treatment of Empyema. *J. Am. M. Ass.*, 1945, 128: 577.

Penicillin is a powerful antibacterial agent and almost nontoxic for man. It is not inhibited by pus or other products of tissue destruction. After intravenous or intramuscular administration, penicillin penetrates poorly into collections of pus, but if it is injected directly into an abscess, considerable concentrations persist for from 24 to 48 hours.

In order to effect a cure of pleural empyema by penicillin therapy alone, the causative bacteria must be susceptible to penicillin, the empyema cavity must not be loculated nor contain pieces of necrotic lung or large clots of fibrin, a persistent bronchial fistula must not be present (because of constant reinfection of the cavity), and the lungs must be capable of re-expanding in order to obliterate the cavity. If the pleura becomes so thick that the lung cannot re-expand, operation is necessary in order to move the chest wall in to meet the lung.

Thirteen cases are reported. In spite of the instillations of 50,000 units of penicillin after aspirations, several cases required rib resection. In 1 case, this was required because of the reappearance of pneumococci after three weeks of very intensive penicillin therapy, both intrapleural and intramuscular. In 2 other cases multiple bronchopleural fistulas prevented complete re-expansion of the lung and low grade fever persisted; in these cases penicillin considerably improved the patient's general condition and made rib resection a safe procedure. In a 2-year-old white girl, rib resection was performed because of lack of improvement after 6 days of penicillin therapy. This was followed by a rapid drop of temperature to normal and steady improvement. In another case infection of the chest wall following repeated aspirations made rib resection advisable.

Two patients, in this series of 13, died as the result of empyema, 1 during the course of penicillin treatment, and the other after rib resection; the immediate causes of death were pulmonary hemorrhage and multiple pulmonary infarcts, respectively.

ARTHUR J. LESSER, M.D.

HEART AND PERICARDIUM

Lam, C. R.: Large Anomalous Vein ("Left Vena Cava") Encountered in Operation for Ligation of Patent Ductus Arteriosus. *J. Thorac. Surg.*, 1945, 14: 393.

During the course of operation on a patient suffering from a patent ductus arteriosus with subacute bacterial endocarditis, a large anomalous vein was

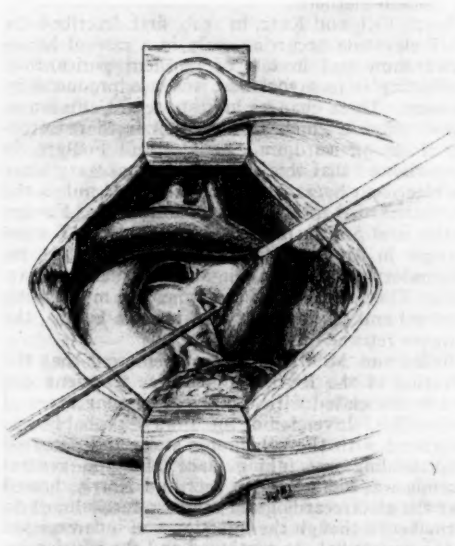


Fig. 1. Semidiagrammatic view of findings at operation, showing the "left vena cava" being held away with the tape to expose the ductus arteriosus, which is in the curve of the aneurysm needle.

seen lying on the aorta, and following a course parallel to it. Its diameter was only slightly less than that of the aorta. Medially, it disappeared into the areolar tissue of the mediastinum, and appeared to enter the pericardium to the right of the aorta. It received at least one large branch from the neck. There was no pulsation or thrill in the vein, and it collapsed with slight pressure.

Persistent left superior vena cava has previously been reported, but no mention has hitherto been made of a left inferior vena cava. The author believes that the simplest explanation for the vein in this case is to assume that it represents the left innominate vein and persistence of a left cardiac vein.

SAMUEL KAHN, M.D.

Urschel, D. L., Bondy, P. K., and Salley, S. M.: Acute Pericarditis. *N. England J. M.*, 1945, 233: 399.

Eight cases of acute pericarditis were studied within three months at the Battey General Hospital, Rome, Georgia. The clinical, x-ray, and electrocardiographic alterations followed variable sequences in the different cases, variations incompletely described in textbooks. Since the diagnosis of acute pericarditis is often difficult, the authors present these cases to emphasize the variable sequence of x-ray, clinical, and electrocardiographic findings, and also to demonstrate the relatively benign nature of certain cases of pericarditis when treated by modern methods.

Scott, Feil, and Katz, in 1929, first described the RS-T elevation occurring early in a case of hemopericardium and in one of purulent pericarditis, attributing it to myocardial ischemia produced by pressure. These changes indicate recent effusion or a gross effusion which will not allow further stretching of the pericardium. Foulger and Foulger, in 1929, showed that this change was temporary since the electrocardiogram returns to normal unless the intrapericardial pressure is maintained. Fowler, Rathe, and Smith, in 1933, correlated the T-wave changes in experimental pericarditis with the inflammatory reaction in the subepicardial myocardium. They also showed that when the myocarditis subsided and the inflamed area became fibrous, the T-waves returned to normal.

Bellet and McMillan, in 1938, showed that the elevation of the RS-T segment was transient and usually associated with rapidly developing types of pericarditis. Inversion of the T-wave probably was associated with the subchronic stage and occurred when healing was taking place and the general toxemia was less. Vander Veer and Norris showed that the electrocardiogram might return almost to normal even though the infection and inflammation of the pericardial sac continued and the effusion increased. Elevations of the RS-T segment have not been observed in tuberculous pericarditis.

This series consists of 8 cases, all men between 22 and 27, 6 white and 2 negro. The causative organism was the tubercle bacillus in one case, the meningococcus in another, and the pneumococcus in the third case. The organism was presumed to be tuberculous in 2 cases and rheumatic in 3. These cases were studied by graphs correlating the heart size, the sum of the T-waves, the elevation of the RS-T segments, the highest temperature daily, and the time of pericardial friction rubs (Fig. 1). The 8 cases are reported in detail.

Cases 1, 2, and 3, although caused by different etiological agents, graphically presented similar pictures. The heart increased rapidly in size in all, reaching its maximum at ten days. At this time there was little or no change in the electrocardiogram, although some elevation of the RS-T segment had occurred in cases 1 and 2. The maximum T-wave inversion occurred in all 3 after the heart returned to original size. T-wave inversion sometimes occurs after the temperature has returned to normal and the patient is clinically well. Cases 1 and 2 illustrated this. The T-wave total in case 1 was positive throughout, and no single electrocardiogram was typical of pericarditis. Only by repeated examinations could the characteristic picture be demonstrated on the graphic chart. This emphasizes the point that the diagnosis of pericarditis by means of electrocardiograms is frequently impossible without repeated examinations.

In case 4, the patient, presumably with tuberculous polyserositis, continued to run a low grade fever after 2 months of illness. The T-wave showed a maximum inversion after the heart returned to normal size and remained inverted as long as the patient was under observation, during which time the pericarditis continued to be active. In case 5, the T-waves remained low for 9 months, during which time there was clinical evidence of activity of the rheumatoid process.

Case 6, a severe rheumatic pericarditis, showed that the heart had reached its maximum size and was returning to normal before the T-waves reached their lowest point. The seventh case was the only one to show a maximum T-wave inversion before the heart reached its greatest size. Early T-wave inversion was followed by nearly isoelectric waves and then by more marked inversion. This rapid electrocardiographic alteration occasionally is seen in acute myocarditis, secondary to rheumatic fever or myocardial infarction, but was not seen in the other cases studied. Possibly the early inversion may have been caused by rapidly accumulating fluid in a pericardial sac that could not stretch. This heart never became particularly large in spite of a severe degree of T-wave inversion, and no evidence of cardiac tamponade appeared at that time. This patient was first seen on his sixtieth day of illness with a normal sized heart, no fever, T-wave inversion, and normal white blood count and sedimentation rate. The T-waves became upright in 4 weeks.

Case 8 followed a typical pattern for 2 months. The electrocardiograms showed a rapidly progressive increase in the T-wave inversion till the twenty-ninth day. The inversion totaled 11.5 mm. and was

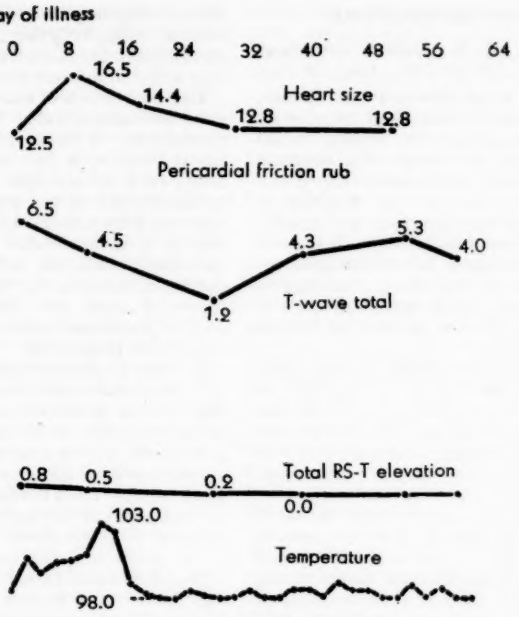


Fig. 1. Graph of findings in case 1.

the most marked in the series. From the twenty-ninth to the fifty-first day it decreased and then remained unchanged. The sedimentation rate was normal by the thirty-first day and the heart was normal by the thirty-eighth day.

The first change generally referred to in textbooks is the elevation of the RS-T segment. It was noted in 5 of 7 cases, the highest being 2.0 mm. The change was transient and persisted from 6 to 30 days. It should be carefully searched for in every suspected case of pericardial inflammation since it is the first demonstrable change. However, normal persons may show this finding, and, therefore, serial electrocardiograms are often necessary before an accurate diagnosis can be established.

In this series the maximum T-wave inversion came between the sixteenth and forty-third days of disease, the average time being the twenty-seventh day. This time interval is important since a patient with acute pericarditis may die long before diagnostic T-wave inversion appears. Sometimes the T-wave inversion does not involve all four leads, and occasionally only one or two are inverted. There is usually some reduction in the total T-wave deflection which can be shown by careful measurements in serial electrocardiograms.

In 5 cases, the T-waves returned to normal in an average of 59 days. In 1 case they remained low for 9 months; in another they remained inverted for 10 weeks, and in a third case for 3 months. The authors are not certain about the significance of persistent T-wave inversion long after the temperature, pulse, chest x-ray film, white cell count, and sedimentation rate have become normal. These changes may be similar to those in cases of myocardial infarction in which T-wave deviations may persist for many months after the acute incident. The authors believe, however, that persistent inversion must be regarded with caution and for this reason they restrict the patient's activities until the T-waves return to normal.

There was no consistent variation in the QRS amplitude, although a lowered total deflection has been mentioned as a diagnostic sign in acute pericarditis.

The heart rapidly reached its maximum size in this series. In 2 of the cases the pericardium was tapped to demonstrate fluid. In all of the others there was a roentgenological diagnosis of pericarditis with effusion.

The pericardial friction rub appeared from the second to thirteenth day of disease in this series. It persisted for a period of from 4 to 16 days with an average of 9 days. Only 1 case failed to show a pericardial rub.

As judged from the cases observed, there is no significant electrocardiographic difference in the pericarditis caused by rheumatic fever, tuberculosis, or pneumococcal or meningococcal infection.

ROBERT R. BIGELOW, M.D.

ESOPHAGUS AND MEDIASTINUM

Adams, R., and Hoover, W. B.: Benign Tumors of the Esophagus. *J. Thorac. Surg.*, 1945, 14: 279.

Benign tumor of the esophagus is a rare disease, when considered in terms of the total number of reported cases, the frequency in respect to all esophageal tumors, or the percentage of all patients with esophageal symptoms in whom the cause is a benign tumor. However, these lesions comprise an important clinical group because they are readily curable by proper surgical management. They are interesting from the standpoint of differential diagnosis, prognosis, and rarity, and are a challenge to the surgeon who finds pleasure in detecting and correcting the bizarre ailment. The grand total known to us is 97 cases.

From 1933 to 1943 the percentage of cases diagnosed during life was higher, which is explained by the increasingly widespread use of the precision methods of diagnosis—fluoroscopy with barium and esophagoscopy. Also, the number of cases discovered and recorded during the last 11 years is over one-half as large as the number of cases reported in the preceding 220 years. Three cases are reported in detail.

The symptoms of all esophageal lesions are so similar that they usually afford little differential diagnostic information. A small tumor rarely causes any symptoms and unless discovered incidentally in the course of fluoroscopic examination its presence ordinarily is not suspected until its size interferes with swallowing. In reviewing cases of carcinoma of the esophagus and the literature of benign esophageal tumors, one is impressed with the frequency with which patients have been considered neurotic (globus hystericus) until they began to regurgitate solid food. Dysphagia appears much more slowly with benign tumors than with carcinoma. This is partly explained by the facts that the rate of growth, as a rule, is much less rapid, and that ulceration, while common and extensive with cancer, is late and minimal with benign tumor. Case 3 illustrates the dramatic nature that symptoms may assume if torsion of the pedicle or trauma to the body of a pedunculated benign tumor induces venous obstruction and edema.

The 3 patients had no helpful physical signs, but in all of them the roentgenological studies with barium brought out characteristic features of benign esophageal tumors. The walls of the esophagus appear elastic. Peristaltic waves pass through the tumor-bearing region. Even with a large intramural growth in one wall of the esophagus, the wall directly opposite is covered with normal mucosa. As shown by the 2 intraluminal cases, barium flows evenly around the tumors. As is evident in the roentgenograms in case 2, a thin stream of barium outlined each lateral margin of the growth with no break in the regular mucosal pattern, except at the upper margin of the negative intraluminal shadow where a film of barium seemed to be fitted as a cap over the superior tumor surface. One needs only to compare these roentgenograms with similar ones showing the narrow, thick, irregular channel in the presence of a carcinoma in the same region to realize how definitely they differ in appearance.

The extirpation of each of these lesions presented some problems peculiar to location, pathology, and the anatomy of the esophagus. In case 1, an intramural fibroma, it had to be determined with certainty from which organ the tumor arose and, after its localization to the wall of the esophagus, it was removed with preservation of an intact mucosa. In case 3, a pedunculated polyp, an easy and safe endoscopic operation, instead of a hazardous external operation through the incised cervical esophagus, depended upon the suspension laryngoscope for good exposure and upon the electrocoagulating snare for reliable hemostasis.

In case 2, an intraluminal fibroma, the problem was somewhat more involved. The tumor was too large to be removed endoscopically, and it was situated too low to be reached through an incision in the neck. Yet such a tumor must be removed with maintenance of the esophageal continuity, or one must accept the alternative of an esophageal resection, cervical esophageal fistula, gastrostomy, and external esophagoplasty with the multiple operations, mutilation, and frequent disappointment.

In order to avoid fatal postoperative mediastinitis, rigid asepsis and perfect healing must be achieved. As a contribution to the attainment of these ideals, the esophagus should be defunctioned during the periods of preoperative esophageal sterilization and postoperative healing. Finally, one must be able to operate in the upper posterior mediastinum, a region admittedly difficult of surgical access, with the wide exposure prerequisite to painstaking and aseptic technique. Each patient recovered without complication.

The literature of benign tumors of the esophagus is reviewed. Various diagnostic and technical problems arising in the management of such cases are discussed. JOHN E. KIRKPATRICK, M.D.

MISCELLANEOUS

Titche, L. L.: Postbronchoscopic Reactions. *Ann. Otol. Rhinol.*, 1945, 59: 568.

The use of the bronchoscope for diagnosis and treatment of bronchopulmonary disease is well covered in the literature, but there are a few articles emphasizing the harmful effects of this procedure.

Bronchoscopy offers a simple and direct means of investigating bronchopulmonary disease, since a lesion of the parenchyma always results in changes of the mucus membrane of the draining bronchus. By watching these changes one can study the character and progress of lung lesions.

Bronchoscopy was performed by the author for diagnosis in cases in which the sputum was negative but the x-rays revealed tuberculosis, as a routine prethoracoplasty procedure, and for diagnosis and treatment of endobronchial tuberculosis. Bronchos-

copy was employed for diagnosis in nontuberculous lesions, and as part of the treatment of bronchiectasis and of asthmatic patients for the aspiration of secretions.

From January 1, 1943 to January 1, 1945, 361 bronchoscopies were performed on 214 patients. Two hundred and forty-five of these were for 147 tuberculous patients. Of this group, 103 showed a rise in temperature—91 during the first 72 hours and the remaining 12 up to the eighth postbronchoscopic day. This temperature rise varied from ½ degree to 4½ degrees. In 3 cases the elevation did not persist past the day of the procedure; in 36 the temperature returned to normal the next day, in 17 by the second day, and in 15 by the third day.

In addition to this initial rise, 22 cases showed a secondary rise after the temperature returned to normal. In 16 cases, this rise occurred between the ninth and thirteenth days following bronchoscopy, in 2 it occurred on the fifth day, and in 1 case each on the seventh, eighth, fourteenth, and fifteenth days. The temperature elevations ranged from ½ to 6 degrees, and lasted from 1 to 42 days. In 15 cases, the temperature subsided within a week and in 5 others by the end of the second week. One patient had an elevated temperature until the forty-second day.

Of the patients with a secondary rise, 4 showed an extension of the disease in the lungs on x-ray examination. The author reports these cases in detail.

In attempting to see whether these reactions were caused primarily because the patients were tuberculous, the author studied the records of 67 patients with bronchiectasis, asthma, pulmonary malignancies, lung abscess, or chronic bronchitis. A total of 116 bronchoscopies was done on this group, and 37 showed temperature rises in the first week—32 of which occurred during the first 72 hours. This rise ranged from ½ degree to 4 degrees. In 36 cases, the temperature returned to normal in 1 week, and in only 2 of these was there a secondary rise in temperature.

The initial rise in temperature in a majority of instances is due to the trauma of instrumentation, as evidenced by the similarity of the reactions in tuberculous and nontuberculous patients. The secondary rise in tuberculous patients is an important sign and appears to indicate a spread or activation of the disease. In the nontuberculous patients, the secondary rise can be attributed to reactivation of the infection or to a secondary infection resulting from the instrumentation.

In order to prevent the further occurrence of these reactions, the author suggests a more careful selection of patients for bronchoscopy, a minimum of trauma during instrumentation, and encouraging the patients to clear the tracheobronchial tree of secretions as soon as possible. Many believe that the disturbance of the cough reflex may be associated with the febrile response and extension of tuberculous disease. The author thinks that the minimum quantity of anesthetic necessary should always be used in order to disturb the cough reflex as little as possible.

ROBERT R. BIGELOW, M.D.

SURGERY OF THE ABDOMEN

GASTROINTESTINAL TRACT

Brunschwig, A., Bigelow, R. R., and Nichols, S.: Intravenous Nutrition. *J. Am. M. Ass.*, 1945, 129: 441.

Brunschwig and his associates report an instance of intravenous nutrition which was carried out over a period of 46 days. The patient had received no food by mouth, and at the end of this period he was subjected to a partial enterectomy. Intravenous nutrition was continued for 9 days postoperatively. The total period of nutritional support, entirely by vein, was 55 days before food was permitted by mouth.

The patient was a 50 year old man who presented hypertension and a palpable mass on the right side of his abdomen. At operation a cystic mass was found bulging from the lower anterior pole of the right kidney. The mass was removed without rupture.

Despite a somewhat uneven postoperative course, the wound appeared to heal satisfactorily, but on the sixteenth day there was almost complete disruption following cough, and at repair a loop of small bowel was observed to have become healed into the depths of the wound. There were two oval patches of apparent necrosis on the bowel wall and by the end of four days the bowel contents poured out of the wound in copious quantities. Fistulas formed and the wound again separated widely. On ingestion of food, a copious discharge from the wound occurred.

In spite of the reconstructive measures, some escape of the bowel content continued. In order to reduce the quantity of material passing down the bowel, the patient took only water by mouth and he was nourished entirely by intravenous fluids, consisting of dextrose in saline solution, 5 per cent amigen in 5 per cent dextrose, and sodium chloride.

Vitamins C, B, and K were also given hypodermically, and blood transfusions were given on five occasions.

After 46 days of intravenous nutrition, reparative surgery was done for closure of the wound and reestablishment of intestinal continuity. Bowel repair was effected and intravenous nutrition was maintained for 9 days postoperatively. The patient was then permitted to take food by mouth, which he did readily and without distress.

The experience in this case suggests that intravenous nutrition, permitting the withholding of food by mouth, might prove beneficial in the management of large fistulas high in the small bowel, since discharge from the fistulas would be appreciably reduced, which would permit a degree of healing that might then be completed by surgical closure.

STEPHEN A. ZIEMAN, M.D.

Schindler, R.: Passage of Air through the Gastric Wall during Gastroscopy, with No Wound Demonstrable 3 Hours Later. *Gastroenterology*, 1945, 5: 34.

Mishaps following gastroscopy are rare, and the one described is the first one the author has ever observed since using the flexible standard instrument with the flexible tip. In other words, this is the first complication occurring in more than 4,700 gastroscopies, certainly a remarkably low incidence of complications in an endoscopic procedure.

The author presents the case of a 40 year old male who complained of a "bad stomach." No other symptoms were present. Since physical and laboratory examinations failed to reveal any abnormalities, further diagnostic procedures were carried out. Gastroscopy was performed with 2 per cent pantocain anesthesia. The patient was co-operative, and the gastroscope was easily introduced. When the cardia was approached, the head had to be taken back a little, and some of the physicians present believed that the patient at this moment experienced some pain. Air was injected after deep introduction of the instrument, and dark red folds straightened out. However, they remained so for only a fraction of a second, and then they collapsed again. The injection of air was repeated several times, always with the same result, the immediate collapse of the stomach wall. For a fleeting moment the author thought he saw a grayish-white surface. This suggested the diagnosis of pneumoperitoneum.

After removal of the gastroscope the patient felt faint and distended. There was no shoulder pain, and the pulse was very good. The liver dullness had disappeared, and it was certain that pneumoperitoneum was present. Three hours later, laparotomy was performed. When the peritoneum was opened, the air escaped with a whistling sound. An extensive search, carried out in the most meticulous way, revealed no perforation of the stomach or abdominal portion of the esophagus. One hundred cubic centimeters of methylene blue were injected through a Levin tube and the pylorus was compressed, but no blue discoloration was seen about the outer surface of the stomach. Then oxygen was blown into the stomach under 60 lbs. of pressure. The stomach was completely distended, but at no point was there any escape of gas.

In this case, obviously no perforation had occurred, because perforation with the thick gastroscope would certainly have caused a hole which could still be found after 3 hours. It must be assumed that the pressure of the instrument had caused a slitlike rupture of the stomach which closed immediately. The remarkable point is that 3 hours later there still was air in the abdominal cavity, but the lesion itself was sealed up completely and could not be found.

In a simple rupture of the stomach, such as that described here, the danger of conservative treatment probably is no greater than that of surgery, and if the diagnosis is made, a feeding is avoided for several days, and conservative treatment is justifiable.

DOUGLAS R. MORTON, M.D.

Petrén, G.: The Frequency of Gastric and Duodenal Ulcers in Sweden during the War. *Acta chir. scand.*, 1945, 92: 150.

A survey of cases of perforating ulcers operated on in Sweden during the period from 1930 to 1943, inclusive, reveals that their number was increasing by about 3 to 5 per cent yearly up to and including the year of 1941. In 1942 a sudden increase of 35 per cent occurred, and in 1943 the figure was 75 per cent higher than it was in 1940 and 1941.

This investigation supports the opinion held by numerous Swedish physicians that the frequency of gastric ulcers during the last war increased more than that of duodenal ulcers, contrary to the tendency of the last mentioned to increase in frequency in the past 25 to 30 years. The niches visible in roentgenograms also seem to be getting larger. According to many internists, the ulcers in recent years show a lesser tendency to heal.

While the mortality after operations for perforating ulcers ranged during the preceding decade between 18 and 20 per cent, it fell to between 13 and 14 per cent in the last two years.

While the number of operated cases with perforated ulcers was 6.9 per cent per 100,000 population in 1930, it rose to 11.3 per cent in 1943.

It is very difficult to draw any conclusions as to the frequency of ulcers in general from the number of cases with perforated ulcers. Recent observations show that ulcers perforate in men more frequently than in women and that a duodenal ulcer perforates more easily than a gastric ulcer. It follows that the frequency on perforations depends on the relative number of duodenal ulcers and the number of male patients in a given material. Apparently the frequency of duodenal ulcers and the number of men in the entire ulcer material increased in most localities in Sweden in the last one or two decades. The author is inclined to assume that the rapid rise of the number of perforated ulcers in 1942 was attributable to the considerable increase of frequency of the total number of ulcers.

JOSEPH K. NARAT, M.D.

Anderson, R. H., Allen, G. L., and Packard, G. B.: Factors Influencing the Prognosis in Acute Perforated Peptic Ulcer Based on a Review of 59 Consecutive Cases at the Colorado General Hospital. *Rocky Mountain M. J.*, 1945, 42: 661.

The authors review 59 consecutive cases of acute perforation of gastroduodenal ulcers at the Colorado General Hospital, Denver, covering the 12 year period from 1932 to 1943.

The authors state that the incidence of peptic ulcer in general is increasing while the frequency of acute perforation is becoming proportionally greater. In the series of cases reviewed, the authors could find no occupational relationship. There were 53 males to 6 females, indicating that men with ulcers suffer a higher proportion of perforations than do women, as the general average of ulcer incidence is 6 men to 1 woman. Most of the authors' patients were in the fourth and fifth decades of life.

Fifty of the patients had had previous symptoms suggestive of ulcer, while the other 9 had no suggestive history and the sudden onset of perforation occurred without warning. The great majority of these patients experienced the typical sudden onset of excruciating epigastric or upper abdominal pain that is often associated with prostration. Vomiting was not a constant or conspicuous symptom though many of the patients had vomited one or two times.

The most constant physical finding was the extreme, or boardlike, rigidity of the abdominal wall with deep and rebound tenderness. Additional evidences of perforation were the early low temperature and pulse, the history of past symptoms of ulcer, and the x-ray evidence of free air in the abdominal cavity.

The early recognition of this catastrophe and its correction before general peritoneal infection has been superimposed upon the widespread chemical irritation should be one of the greatest factors affecting the mortality rate. The size of the perforation and the consequent amount of soiling, the location, whether gastric or duodenal, and the age of the patient have much to do with the prognosis.

There is a definite increase in mortality rate with age. As gastric ulcer is more common in older patients, the higher death rate may well be due to the patient's age rather than to the location of the ulcer.

Operative treatment of perforated ulcer may be gastrostomy, simple closure, closure and gastroenterostomy, excision with or without pyloroplasty, and partial gastric resection. The choice is still a controversial issue, although in this country the simplest procedures are generally preferred while in continental Europe partial resection has had much favor.

In the primary treatment there are two factors to consider: first, the immediate saving of life, and second, the prevention of a recurrent ulcer. In 4 of the patients in this series, a mushroom catheter was inserted through the ulcer perforation to provide a means for early feeding and hydration as soon as the digestive tract could tolerate fluids. The catheter was removed in from 10 to 14 days, which usually was followed by prompt cessation of drainage. All 4 patients made a prompt recovery. In 32 cases a simple closure was done. The procedure described by the authors includes purse-string closure, simple infolding suture, fastening of the omentum over the perforation, and the folding over of a flap of the stomach, according to the description of Gatch. Twenty-five of these patients recovered, leaving a mortality of 21.87 per cent.

Adding a gastroenterostomy to the closure of the perforation adds to the time and risk without

sufficient reward. If the closure of the perforation causes too great a narrowing of the duodenum, the addition of a gastroenterostomy is needed; but other arguments in its favor, such as relief from future ulcer symptoms, earlier feeding, and obviating of future operation, seem unsound. The same probably holds true for excision and pyloroplasty. The 2 patients on whom gastroenterostomy was done lived.

In many reports, gastric resection has shown the lowest mortality. Nevertheless, it is doubtful that this operation should ordinarily be given serious consideration. Gastrectomy is a highly technical operation which is not applicable for the average case treated under emergency conditions by the average emergency staff.

In conclusion the authors state that:

1. It should be possible to lower our mortality. High mortality may be due to relative unfamiliarity with the surgical technique, to a delay in surgery until peritoneal infection has set in, or to a mistake in diagnosis resulting in the wrong approach with a consequent longer and less accurate operation. Leaving out age and other angles beyond our control, the time elapsing between perforation and operation is the most important factor affecting the results of the individual operator.

2. A correct diagnosis can usually be made as the clinical features are so striking as to make it apparent that a surgical emergency exists. In the great majority, free air in the abdominal cavity can be shown by x-ray if one wishes additional support.

3. While radical resection may have its place in selected cases in the best surgical clinics, the routine treatment should be the earliest possible and the simplest thorough closure with the best supportive preoperative and postoperative treatment.

4. Recurrence of ulcer symptoms will take place in the majority of patients. In the event of ulcer recurrence the proper medical treatment can be outlined and, if surgery becomes necessary, the best operation for the condition can be chosen after due deliberation and study and after proper preparation.

CHARLES BARON, M.D.

Udaondo, C. B., and Nasio, J.: The Incidence of Gastric and Duodenal Ulcer in Different Professions and Occupations (Incidencia de la úlcera gástrica y duodenal en las profesiones y oficios). *Prensa méd. argent.*, 1945, 32: 1581.

The authors have made a careful study of the profession or occupation of 2,557 patients with gastric and duodenal ulcers and give tables showing the details of their findings. These ulcers are more frequent among professional people than among physical workers and among all the professional people they are most frequent in public officials, probably because of the psychic demands made on them. A study of the cases in physical workers, in whom ulcers are less frequent than in psychic and intellectual workers, shows that gastric and duodenal ulcers are not caused by repeated microtrauma of the epigastric region, as has frequently been claimed.

Among the professional people with ulcer there are many more male than female patients. The localization of the ulcer is related to a certain extent to the patient's occupation, duodenal ulcer being more frequent in professional people and gastric ulcer in workmen. Domestic work is classified as psychophysical and most of the patients in this group are women. They show a predominance of gastric ulcer.

A bad course of the ulcer is more frequent in professional workers than in workers of the physical and psychophysical groups. This also tends to disprove the theory that violence is involved in the causation of ulcer. A bad course does not seem to be related to sex or localization of the ulcer.

Recurrences were more frequent after one operation in the physical workers and after two operations in the professional workers. Among the few cases in which three operations were performed there were more physical workers with recurrences.

A hyperacid type of gastric secretion predominated in the physical workers, a normal acid curve in the psychic workers, and hypoacid or normal acid curve in the psychophysical groups. About 20 per cent of the patients showed some habit tending to cause alimentary intoxication, such as the use of tobacco, alcohol, mate, or coffee. The use of alcohol or tobacco was more frequent among the physical workers and of coffee among the psychic workers. The use of tobacco or mate did not seem to have any special tendency to cause ulcers.

AUDREY G. MORGAN, M.D.

Dailey, M. E., and Miller, E. R.: A Search for Symptomless Gastric Cancer in 500 Apparently Healthy Men of 45 and Over. *Gastroenterology*, 1945: 5: 1.

The authors, in an attempt to discover minimal (early) gastric malignancies, examined 500 normal men by a barium meal examination, the rationale being precisely that of a mass chest survey. All subjects were 40 years or over and were free of digestive complaints. All were examined by the barium meal procedure and fluoroscopy. A full gastrointestinal series was performed whenever a hint of abnormality was present.

The findings revealed that 3 men of 500 appeared to have persistent gastric lesions—one had a gastric ulcer, another a suspected control polyp, and the third had antral gastritis— the last being verified by resection.

While the authors' work was in progress, St. John, Swenson, and Harvey uncovered 3 gastric malignancies among 2,413 men and women. However, the individuals in their survey were not necessarily asymptomatic. Rigler at the same time discovered, in routine x-ray examination of the stomach, 17 gastric cancers and 15 polyps among 217 patients with pernicious anemia.

The authors conclude that a survey of the general population in search of gastric cancer is not worth while, but that studies of selected groups, such as

persons with pernicious anemia, should be expanded. On the other hand, the rigid selection of candidates excluded individuals with the slightest symptoms and thus the results in no way detract from the view that even mild dyspepsia in older individuals demands a prompt and adequate investigation.

DOUGLAS R. MORTON, M.D.

Waugh, J. M., and Fahlund, T. R.: Total Gastrectomy. *Surg. Clin. N. America*, 1945, 25: 903.

In 77 cases of total gastrectomy by the abdominal route performed at the Mayo Clinic from 1917 to 1943, inclusive, the over-all surgical mortality rate was 14.3 per cent. The mortality rate for the 33 cases in which operation was performed between 1917 and 1939, inclusive, was 60.6 per cent as compared with the mortality rate of 3.18 per cent for the 44 cases in which operation was performed between 1940 and 1943, inclusive. Gastrectomy was performed in 1943 in 20 cases with 5 deaths, a mortality rate of 25 per cent.

Waugh and Fahlund attribute the remarkable reduction of surgical mortality in this series to the increased experience of the surgeons in dealing with the procedure, improvements in postoperative care, the use of chemotherapy, and the early recognition and rigorous treatment of postoperative complications.

More than half of the patients who survived the operation of total gastrectomy for cancer lived 2 or more years, whereas 2 patients who underwent total gastrectomy for benign lesions have lived 6 and 8 years, respectively, and are still alive as far as can be ascertained.

STEPHEN A. ZIEMAN, M.D.

Iason, A. H.: Intussusception in Adults. *Surgery*, 1945, 18: 457.

Statistical data appear to show that of all intussusceptions, the incidence in adults is about 5 per cent. It is common medical experience that in infants there are, as a rule, no discoverable etiological factors, while in adults there is usually an organic lesion, a benign or malignant tumor, as the basic cause. Other provocative influences are: (1) typhoid ulcers, (2) tuberculous ulcers, (3) dysentery, (4) acute appendicitis, (5) Meckel's diverticulum, (6) a congenital ileal band, (7) a submucous lipoma of the ileum, (8) a foreign body, (9) a sudden radical dietary change, or (10) neoplasms.

Enlarged lymphoid patches not infrequently cause intussusception, and an instance in point appears to be the high incidence of the ileocecal variety, with the presence of large Peyer's patches. The detrusor action of the terminal ileum and the greater size of the colon have been regarded as other probable causes.

The majority of intussusceptions are of the enterocolic variety, and it is in the ileocecal zone that considerable anatomic alteration in the size of the gut takes place.

Fraser proved that the innervation of the ileocecal zone is distinctive in that the nerve supply of the ileum is sympathetic and parasympathetic; the cecum receives a supply of sympathetic nerves only. An explanation is thus found for the descending peristaltic irregularity.

Intussusception at times occurs during an attack of enteritis and there is a strong probability that the swollen Peyer's patches may induce the hyperperistalsis.

Intussusception of the gastrointestinal tract may take place anywhere between the stomach and the rectum. The large bowel is the most frequent site of involvement in adults because benign and malignant growths, particularly the former, are more common there than in any other part of the gastrointestinal tract.

An intussusception usually forms a rather firm sausage-shaped swelling composed of three concentrically arranged tubes or layers—the afferent, efferent, and ensheathing. The first two form the intussusceptum and meet at the apex, or most distal part of the invagination; the ensheathing layer constitutes the intussuscipiens and joins the returning layer at the neck of the intussusception.

Intussusception may be single or compound. In the latter, the primary invagination is surrounded by a secondary one, which may in turn be surrounded by a tertiary.

Three forms of intussusception may be distinguished:

1. Enteric (10 to 15 per cent), in which the small intestine invaginates, is prevalent in older children and adults. It is usually of organic causation. In the ileoileal variety only the small intestine is involved; it may progress to become an ileoileocolic variety, ordinarily discoverable in children.

2. Colic (5 to 10 per cent), in which the colon ensheaths (therefore, colocolic). This variety occurs in elderly persons. A not infrequent cause is a polypoid carcinoma or a benign polypoid growth.

3. Enterocolic (75 to 80 per cent), in which the ileum invaginates into the colon. This is common in infants.

When a gastroenterostomy has both an afferent and efferent jejunal loop, the following three varieties of jejunogastric intussusception may, on rare occasions, occur as complications within a few days or years after the anastomosis: (1) the afferent loop solely may intussuscept into the stomach; (2) the efferent loop may retrograde and stop short of, or pass through, the gastroenterostomy stoma; and (3) the afferent and efferent loops may intussuscept into the stomach.

In adults the symptoms of intussusception are not as prominent as in infants. They are vague in most instances, with signs of mild recurrent obstructions associated with symptoms of the provoking cause. There are colicklike abdominal pains, nausea, vomiting, obstipation, and bloody stools. A mass in the abdomen is commonly not palpable. In jejunal intussusception, symptoms, usually intermittent, may be present for months or years. There is always a history of upper abdominal pain, especially after

meals. Nausea and vomiting are common. Blood in the stools is not as common in jejunal intussusception. The abdomen is not distended early, but becomes manifestly so as the obstruction progresses. On auscultation exaggerated peristaltic sounds may be heard until there is complete obstruction, when one elicits the significant silent abdomen. A tumor mass may be felt, with or without anesthesia. It is sausage-shaped and lies transversely across and subjacent to the abdominal wall.

The diagnosis is mainly roentgenographic or surgical.

If in a patient with a gastroenterostomy the afferent loop is intussuscepted, the patient will as a rule complain of (1) postprandial epigastric pain with colicky exacerbations and (2) bilious vomiting. The roentgenograms in most instances will reveal a distended afferent loop. The opaque meal will demonstrate a rounded filling defect in the stomach (due to the intussusception) upon which a relief pattern, the jejunal plicae, will be observable. If the efferent loop takes a retrograde intussusceptal course, an acute high small bowel obstruction results with consequent colicky abdominal pain and the vomiting of gastric, then bilious, and finally intestinal contents. If the afferent and efferent loops intussuscept into the stomach, an acute, high obstruction obviously results.

The differential diagnosis in intussusception must be made from (1) Henoch's purpura, (2) acute enterocolitis, (3) simple colic, and (4) tuberculous mesenteric glands.

The barium enema and examination of the abdomen without opaque media are used to diagnose intussusception. In subacute and chronic intussusception in adults, it will be found that the combined contrast meal and enema examination will prove most helpful in diagnosis.

Palliative treatment is justifiable only under the most exceptional circumstances. An early intussusception can sometimes be completely reduced with a pressure enema of water or air. This method is dangerous and is better employed in infants and older children. In early cases a barium enema may be given at low pressure and an attempt should be made to reduce the mass under fluoroscopic control. This is often surprisingly successful in the colic or enterocolic varieties. It is almost impossible to reduce the enteric variety merely by rectal injection.

As a rule, an immediate surgical operation should be performed as soon as the diagnosis is made. Ether anesthesia is best avoided. Spinal anesthesia is preferred. A one-stage operation may be performed. When a hot pack fails to effect reduction, an attempt should be made to insert a finger into the neck of the intussusception (between the entering and returning layers) and to sweep it around in this space; the adhesions are thus broken down and reduction facilitated. If this maneuver proves ineffective, a rubber-covered forceps is placed in the neck as far as is safely possible and the blades are opened in several places. This procedure serves the dual purpose of dilating the neck and of breaking down recent adhesions. If the aforementioned methods fail, the neck should be divided for an inch or more along the antimesenteric border with a pair of forceps. The incision is closed transversely to avoid narrowing of the lumen of the gut.

If the large intestine is the intussusception site, graded operations are preferable. In some cases of irreducible, uncomplicated intussusception a short-circuiting operation may be performed. If the intestine is irreducible and gangrenous, one of the following expedients may be tried: (1) resection, with end-to-end, side-to-side, or end-to-side anastomosis; (2) Jesset's operation—removal solely of the invaginated part of the bowel through the encompassing part of the intestine. After the incision in the bowel is made, the invaginated part is withdrawn in a downward direction as far as possible and cut away. Circular suturing closes the cut margins of the amputated, gangrenous bowel. The ensheathing part of the bowel is then approximated and united by a through-and through continuous suture whereon a Lembert stitch is placed. Finally, a few interrupted sutures close the neck of the intussusception.

The treatment of jejunogastric intussusception is always surgical. If the afferent loop is involved, reduction is affected by slight traction. A recurrence is prevented either by anchoring the afferent loop to the stomach or to the transverse mesocolon, or by undoing the gastroenterostomy. Sometimes a gastrectomy, in part, including resection of the anastomosis, may be deemed advisable. If the efferent loop is entangled, reduction by traction may be found adequate, but in delayed cases, with gangrene, resection must be carried out. When both intestinal loops are involved, reduction is by traction.

JOSEPH K. NARAT, M.D.

Segal, H. L., Scott, W. J. M., and Watson, J. S.: Massive Hemorrhage from the Small Intestine. *J. Am. M. Ass.*, 1945, 129: 116.

As a result of the analysis of the authors' cases and of those reported in the literature, the following suggestions are given to help differentiate massive gastrointestinal hemorrhage due to lesions of the jejunum and ileum from that due to gastroduodenal ulcers:

1. One should be aware that small intestinal lesions may produce this syndrome.
2. The pains present are not quite as typical as those of peptic ulcer.
3. Hematemesis is usually not present.
4. The gastrointestinal series is negative for a definite ulcer, although it may be suggestive of duodenal irritability or pyloric spasm.
5. A roentgenological study should be made of the small loop for retained barium.
6. A Levine tube passed during the episode of melena will not reveal gross blood. (This is done after the barium meal has ruled out a gastric or esophageal lesion).

7. A gastric analysis may show low values for hydrochloric acid.

8. The presence of a palpable mass which slides away from the fingers may suggest a lesion of the small intestine.

9. Small intestinal lesions may be present in addition to a peptic ulcer.

The possibility of a small intestinal lesion should be considered in any patient who has repeated or continuous melena in the absence of hematemesis and in whom the pains seem somewhat atypical for peptic ulcer. Such patients should have diagnostic studies even during the active phase to help determine whether the bleeding is from the common source, peptic ulcer, or from the uncommon origin in the small intestine. JOHN J. MALONEY, M.D.

Shallow, T. A., Eger, S. A., and Carty, J. B.: Primary Malignant Disease of the Small Intestine. *Am. J. Surg.*, 1945, 69: 372.

Primary malignancy of the small bowel is a rare condition, which is difficult to diagnose early. The treatment of this condition requires extensive operative technique and results in a high operative mortality and grave prognosis. Since this is a challenge to the modern surgeon, the author reviews 38 consecutive cases of histologically proved small-bowel malignancy encountered in the Jefferson Medical College Hospital, Philadelphia.

Primary small-intestine malignancy occurs in 0.1 per cent of all autopsies, while large-bowel malignancies are 36 times as frequent. Three per cent of all intestinal carcinomas and 60 per cent of all intestinal sarcomas occur in the small bowel. Each division of the small bowel is involved equally by malignancies, carcinoma being twice as frequent as sarcoma; however, the frequency in the ileum is lowest for carcinoma and highest for sarcoma. Eger reports that of 305 duodenal carcinomas, 62 per cent involved the second portion, 24 per cent the first, and 12 per cent the third; 2 per cent involved the entire duodenum. Small-intestine carcinoids comprise 0.02 per cent of the autopsy and surgical specimens (8.3% of all small-intestine neoplasms). They occur chiefly in the ileum.

Small-intestine neoplasms are grossly classed, in order of frequency, as stenosing, infiltrating or ulcerating, and polypoid. Sarcomas extend toward the mesentery without producing obstruction or hemorrhage, in contradistinction to carcinoma. Carcinoids are small, firm, submucosal, yellow nodules which rarely obstruct, but grow slowly and metastasize to theregional nodes in 25 per cent of the cases, rarely to the liver. Thirty-one of the 38 cases showed metastases and extension to the regional nodes and liver. In 5 of the 7 cases of duodenal carcinoma there were widespread metastases, in 1 case there was regional node involvement, and in 1 case there were no metastases. Of the 7 ampullary lesions, 5 showed metastasis, but in only 1 was the pancreas involved. Of the 24 jejunal and ileal malignancies, 4 were without metastases, 9 had regional involvement, and 11 had widespread metastases. No malignant carcinoids were found.

The early diagnosis of primary malignancy of the small intestine depends on careful evaluation of the history, and the physical, laboratory, and x-ray findings. The onset of symptoms was insidious in most of the cases, although occasionally it was sudden with perforation, severe hemorrhage, or intestinal obstruction. The duration of symptoms varied from 5 days to 7 days and averaged 7 months. Ampullary lesions produced biliary obstruction before intestinal obstruction, the occasional intermittency of the jaundice being due to tumor slough, increased intrabiliary tension which forced bile through the point of obstruction, or subsidence of papillary edema. Over 75% of the small-intestine neoplasms were palpable, fixed if duodenal and mobile if jejunal or ileal. Laboratory studies aid in diagnosis and guide the preoperative and postoperative management. Seventeen of 29 cases gave x-ray demonstration of the lesion. Vomiting caused several examinations to be unsuccessful. Eight neoplasms failed to visualize on x-ray even though the duration of symptoms averaged 14 months. In spite of this, x-ray study seems to offer the best aid to diagnosis of these lesions at the present time.

Decompression of the intestinal tract and maximum improvement medically are essential preoperatively. This is accomplished by correcting any fluid and electrolyte imbalance, anemia, vitamin and plasma protein deficiency, and impaired function of the heart, liver, and kidneys. The type of operation depends on the patient's condition, the location and extent of the growth, and the presence or absence of complications such as jaundice or metastases. Ideally early and adequate resection of the growth and the adjacent mesentery with re-establishment of bowel continuity is the treatment of choice.

Various operations were carried out. One duodenal malignancy was resected. It was located in the third portion; and a side-to-side duodenojejunostomy was carried out, the second portion of the jejunum just distal to the ampulla being anastomosed to the jejunum 10 inches from the ligament of Treitz. The patient was alive and well 10 months later.

In the ampullary group, the bile was redirected to the gastrointestinal tract in all cases. Resection was contemplated in 2 cases without metastases, but the patients failed to survive the first stage. All the jejunal lesions were resected and end-to-end anastomoses done. One case, because of a contact carcinomatous fistula, required a resection of the terminal ileum with an end-to-side anastomosis with the ascending colon. This case was reported in some detail by the author, and 3½ months postoperatively showed normal x-ray studies of the small intestine and colon. One patient with a sarcoma invading the transverse colon is alive 12 years later. This was resected and anastomosed primarily. Another patient with sarcoma of the jejunum died of metastases, fifteen years after the primary operation. Six

ileal malignant tumors were resected and 1 tumor was exteriorized; 3 which were considered nonresectable were treated with x-ray therapy. Of the patients who underwent resection, 1 with lymphosarcoma is well 7 years later, and the 2 others who survived operation could not be traced.

These surgical results compare unfavorably with large-intestine malignancies. Since these lesions are difficult to diagnose and metastasize early, they are usually beyond the curable state at operation. The sarcomas have a better prognosis than carcinomas. The author believes that primary malignancy is most amenable to treatment if it is jejunal and least amenable if duodenal. The author treated 27 of his 38 cases surgically with a 44 per cent operative mortality. Four of the patients are living and well, 12, 7, and 4 years, and 10 months, respectively, after operation. Four others lived 15, 4, and 3 years, and 1 year, respectively. Sixteen survived 6 months or less; 3 were lost to follow up, and 11 expired without surgery. The most common causes of death were metastases and circulatory failure.

ROBERT R. BIGELOW, M.D.

Kiefer, E. D., and Ross, J. R.: Chronic Ileitis. *J. Am. M. Ass.*, 1945, 129: 104.

On the basis of the experience reported here with the treatment of 102 cases of chronic ulcerative enteritis, conservative management is indicated in the early acute forms of the disease, in mild cases of chronic uncomplicated terminal ileitis, and in uncomplicated segmental enteritis with extensive involvement of the jejunum and ileum.

As a general rule, chronic terminal ileitis is best treated surgically. This is in agreement with the conclusions of Ginzburg and Garlock. When the enteritis is complicated by obstruction, fistulas, or abscesses, surgical measures are definitely the treatment of choice.

Although surgery is not successful in all cases, the resection of the inflamed loops of intestine produces a high percentage of satisfactory results. Another point favoring surgical measures is the low operative mortality.

JOHN J. MALONEY, M.D.

Gatewood, J. W.: Solitary Diverticulitis of the Cecum. *Ann. Surg.*, 1945, 122: 52.

The difficulty of differentiating acute appendicitis preoperatively, and carcinoma at operation, from the usual findings in the case of an inflamed cecal diverticulum makes a consideration of this subject of prime importance. The most common preoperative diagnosis made in cases of solitary diverticulitis of the cecum is appendicitis, while in many cases at operation, radical resections are carried out on a presumptive diagnosis of carcinoma. The possibility of solitary diverticulitis of the cecum should always be considered on examination of a patient who has had a previous appendectomy and who complains of right lower quadrant pain. When operating for appendicitis and finding an apparently normal appendix, one should make a careful search for cecal diverticulitis. Two cases of solitary diverticulitis of the cecum occurring in young males are reported.

In most cases of solitary diverticulitis of the cecum, local excision is all that is required to effect a permanent cure. This is in contradistinction to multiple diverticulitis for which most treatment is palliative. As pointed out by Jonas, very large, inflamed diverticula lying close to the ileocecal valve, or between the leaves of the mesentery, so as to jeopardize the cecal blood supply, require extensive resection. In the 2 cases reported one of the most distinguishing features at operation was the normal condition of the bowel surrounding the inflamed diverticulum, which made firm closure easy after local excision of the diverticulum. Associated appendectomy with local excision of the diverticulum is justified and does not increase the risk appreciably. In 1 of the cases microscopic examination of the appendix revealed a diffuse inflammatory process which might have caused trouble if it had been allowed to remain.

JOHN L. LINDQUIST, M.D.

Dennis, C.: Ileostomy and Colectomy in Chronic Ulcerative Colitis. *Surgery*, 1945, 18: 435.

It has been found that with prompt and proper surgical management, chronic ulcerative colitis is not a disabling disease. Surgical management is recommended for all cases of nonspecific ulcerative colitis except the very mild ones that can usually be handled medically. The emergency indications for surgery are: uncontrollable hemorrhage, fulminating disease, impending perforation, and obstruction. Four elective indications for surgery are recognized: cases that resist all forms of medical treatment, segmental ulcerative colitis, very early ulcerative colitis, and polyposis, including the cases with possible malignancy. From the satisfactory results obtained, and until the true nature of the disease shall have been discovered, surgery appears to offer the best hope to the patient.

During 16 recent months at the University of Minnesota Hospitals, Minneapolis, 23 cases of ulcerative colitis were observed; 16 were given the benefit of surgery, and of the 7 not undergoing operation, 2 died, 2 improved, and 3 failed to improve.

The author stresses the fact that extreme thoroughness and precision in every detail of the preoperative, operative, and postoperative care are the important factors that have made surgery for chronic ulcerative colitis a success at the University of Minnesota Hospitals. The procedures used to minimize the risk of surgery and to avoid the many complications that have made ileostomy objectionable are excellently described in full detail.

After careful preoperative preparation, ileostomy is the initial surgical procedure and should not be complicated by any other simultaneous procedures. A method of ileostomy which minimizes the complications of herniation, fecal fistula, and prolapse is described. With meticulous postoperative care

excoriation and breakdown of the skin have been negligible.

The success of meticulous management of these patients is emphasized by the fact that in 20 cases there were 1 case of prolapse, 2 cases of recession, 2 cases of some trouble with skin excoriation, no cases of failure of primary union, no hernias, and 2 deaths. The deaths occurred from pulmonary embolus in one case and from involvement of the ileum, jejunum, and stomach in the other. Colectomy is not done until from 4 to 6 months after the ileostomy, and, except in selected cases, then only for repeated exacerbations of colitis, polyps or carcinoma of the colon, profuse drainage, or continued bleeding.

The rectum is spared in removing the colon, and an improved method of closing the rectal stump is described. In some cases it was possible to reestablish the continuity of the bowel by ileoproctostomy many months after the ileostomy.

DAVID H. LYNN, M.D.

Rubenstein, A. D., and Johnson, B. B.: Salmonella Appendicitis. *Am. J. M. Sc.*, 1945, 210: 517.

It is probable that a significant reservoir of salmonella infection exists among the general population.

The authors studied 811 cases of salmonella infection; 20 of these (approximately 2.5%) developed signs and symptoms of acute appendicitis, and 18 came to operation. All of the cases in which the symptoms of appendicitis occurred were in children or young adults. The difficulty of the differential diagnosis in cases in which these maladies are associated is stressed.

Of the 18 cases which came to operation, 11 showed no acute inflammation, while 7 were found to have acute, subacute, or gangrenous appendicitis. It is assumed that lymphoid hyperplasia of the small intestine, appendix, or mesenteric nodes was responsible for the acute abdominal manifestations.

The authors suggest that an underlying salmonella infection should be suspected in instances of unexplained persistent postappendectomy fever. They further point out that the "recognition of the basic etiology in cases of salmonella appendicitis will aid in the prevention of secondary infections among contacts in the hospital and at home."

DAVID H. LYNN, M.D.

Hoerr, S. O.: Mortality Factors in Acute Appendicitis. *Surgery*, 1945, 18: 305.

The failure of improvement in the mortality figures for patients with acute appendicitis at the Peter Bent Brigham Hospital, Boston, Massachusetts, from 1913 through 1940, stimulated a detailed study of the 106 fatalities during this period. Attention was focused on the 80 operative cases in which death was directly attributable to progressing appendicitis or its specific complications.

Delay in operation was shown to be the major factor in fatal cases. Sixty-seven of the 80 patients were operated on 48 hours or more after the initial symptom. Fifty-eight patients were operated on within 6 hours after reaching the hospital, but hospital delay of more than 6 hours occurred in 16 cases, because of the uncertainty of the diagnosis. It is suggested that operation be performed promptly when the differential diagnosis lies between acute appendicitis and some other condition, such as acute salpingitis, in which operation is not definitely contraindicated. The consequences of delay are reflected in the fact that at the time of operation 53 patients had acute perforated appendicitis, 14 had appendical abscess, and only 13 had acute unruptured appendicitis. There were only 6 fatalities in the cases of patients who were operated on within 30 hours of onset of the condition. Of these, 5 had perforated appendicitis. It must be noted that 49 of the 80 patients had definitely received cathartics.

Fifteen patients had undrained residual abscesses at the time of death. The author states that such abscesses should be especially sought for in cases not improving after a period of 2 weeks from the onset of the disease. Ten patients died of severe ileus or mechanical intestinal obstruction; prompt preventive measures or timely operative intervention might have saved some of them. Three patients died despite adequate dosages with sulfonamides.

Statistics based upon the 80 cases give a slight advantage for the McBurney incision. Statistics, likewise, vindicate the trend in recent years toward closure without drainage, even in selected cases with perforation.

SAMUEL KAHN, M.D.

Hurt, L. E.: The Surgical Management of Colon and Rectal Injuries in the Forward Areas. *Ann. Surg.*, 1945, 122: 398.

Initial surgery of 39 injuries of the colon and rectum was performed by a general surgical team of an auxiliary surgical group functioning with the Fifth Army in Italy. Most of the injuries were caused by fragments. Twenty-nine patients were operated upon within 12 hours of injury; 5 within 6 hours. A short time interval can contribute toward an increased mortality, because more of the severely wounded come to surgery. The average time interval was 15 hours. The contribution of shock toward an increased mortality was exemplified by 5 deaths, in spite of vigorous replacement therapy, among 8 patients admitted in severe shock. The second part of the duodenum was injured in 2 of 4 cases of injury of the hepatic flexure. Peritoneal contamination and early infection responded gratifyingly to forward surgery and its adjuncts, sulfonamides and penicillin, for only 12 patients exhibited objective signs of peritonitis. Eight patients sustaining injuries of the colon or rectum alone were treated successfully. Thirteen with colon injuries complicated by severe concomitant wounds died, a mortality rate of 33.3 per cent. Severe shock, secondary to injuries of the colon complicated by concomitant wounds, was the dominant cause of death. Next to shock, sepsis was the leading cause of death.

For obvious reasons, primary suture of the unprepared colon in the presence of peritoneal contamination has always been condemned in the author's theater. Consequently, all initial operations were designed to divert the fecal current outside the peritoneum. The only exception to this rule has been in those patients sustaining injury between the sigmoid and the extraperitoneal rectum. These perforations were closed by suture and supplemented by proximal colostomy. The type and severity of the injury occurring between the terminal ileum and sigmoid colon usually determined whether a loop or double-barrelled colostomy with spur was to be performed. Single or closely associated multiple anterior and lateral wall perforations and antimesenteric hemisections were exteriorized as loop colostomies. Mesenteric hemisections, transections, and extensive injuries necessitating resection of the colon were exteriorized as a double-barrelled colostomy, with spur, in an endeavor to perform an initial operation that not only diverted the fecal current extraperitoneally, but also left the patient with a simple stoma which could be closed secondarily without entrance into the peritoneal cavity. Since the extraperitoneal closure of a loop colostomy of the right colon is impractical, a single perforation of the right colon was treated by tube colostomy or cecostomy.

Injuries of the splenic flexure and left half of the transverse colon complicated by those of the left diaphragm and left lung, caused by a single missile, were operated upon transdiaphragmatically. Some of the advantages of a thoracic operative approach in thoracoabdominal wounds on the left side were: excellent visualization of the wound tract; easy removal of the frequently fragmented spleen; mobilization of the splenic flexure under direct vision; and elimination of the separate celiotomy incision, with its subsequent pain, which permitted the institution of an intensive cough routine so necessary for the postoperative intrapleural injury.

Before closure of the diaphragm, the injured segment of the splenic flexure or transverse colon was exteriorized either as a loop or double-barrelled colostomy with spur through a stab incision in the left upper quadrant of the abdomen. Likewise, if drainage of the abdomen was desired, the drains were brought out through another, but smaller, stab incision of the left abdominal wall. On the other hand, injury of the hepatic flexure complicated by injuries of the liver, right diaphragm, and right lung, and caused by a single missile necessitated thoracotomy and a separate celiotomy incision, as the liver offers complete obstruction to exploration of the right abdomen.

The initial surgery of extraperitoneal perforations of the rectum consisted of thorough débridement of the wound tract, suture of perforations, and sigmoid colostomy. In addition, resection of the coccyx and incision of the fascia propria were done to insure adequate drainage of the retroperitoneal, posterior, and pararectal spaces. All sigmoid colostomies were of the loop type. However, a recent personal communication with surgeons in Base Hospitals has revealed that loop colostomy for rectal injuries has failed, in many instances, to divert completely the fecal current. Consequently, patients with rectal injuries have arrived at the Base from the Forward Area Hospitals with fecally contaminated buttock wounds and the rectum filled with feces. In the future it is proposed to transect the sigmoid and prepare a spur at the time of initial operation of all extraperitoneal rectal injuries.

Colcock has reported from a hospital in the Zone of Communication that osteomyelitis of the sacrum has been a frequent complication of coccygectomy in those with rectal wounds. Because of this, posterior drainage is now being accomplished without resection of the coccyx. It is the feeling of most of the surgeons in this theater that adequate drainage can be ensured through a curved incision inferior to the coccyx, incision of the fascia propria, and opening of the posterior and pararectal spaces by blunt dissection.

JOHN E. KIRKPATRICK, M.D.

Croce, E. J.: The Management of War Injuries of the Extraperitoneal Rectum. *Ann. Surg.*, 1945, 122: 408.

Injuries of the rectum present many problems which are peculiar to it alone. These problems arise largely from its physiological and anatomic properties. As the organ of temporary storage and evacuation of the solid wastes of the intestinal tract, its contents teem with organisms, many of them potential pathogens, both aerobic and anaerobic. Anatomically, it is for the most part unprotected by infection-resisting peritoneum. It traverses a tissue which is highly vulnerable to infection, and it is difficult of surgical access. In order to understand more fully the implications of the anatomic problems, the essential details of the relationships of the rectum are reviewed.

The clinical syndrome of retroperitoneal sepsis was a nightmare to the surgeons of World War I. Drummond reviewed the problem at the close of World War I. His suggestions as to treatment reveal that the problem at that time was still very much in the experimental stage, although some of his suggestions have proved extremely practical:

In extraperitoneal wounds of the rectum the only hope of success lies in very free local drainage carried out at the earliest possible moment. With a view to establishing efficient drainage, he removed the uninjured coccyx in 2 cases, and in addition arranged for free drainage of the wounds of entry and exit. He found by stripping up the bowel that he was able to expose the wound in the rectum and was thus enabled to drain and pack off the surrounding parts and prevent further tracking by retroperitoneal hemorrhage.

During the past 2 years the authors were fortunate enough to administer definitive treatment to a moderate number of patients returning from the battlefields in various stages of convalescence from war wounds of the rectum, and, in addition, were able to

evaluate the treatment of many others who had not remained under their care. From these observations, it was believed that progress has been made during this war in the management of extraperitoneal injuries of the rectum and that it warranted the crystallization of surgical management. The part played by surgical prophylaxis, in contrast to the supportive measures of blood, plasma, and chemotherapeutic agents, is emphasized. When the latter are applied alone, without surgery, they may influence the early mortality rate in assisting recovery from shock, but they do not appreciably alter the morbidity or late mortality rate from chronic sepsis. These measures have been proved to be merely adjuvants and not in any way substitutes for early and properly executed surgery.

The following conclusions as a result of observations have been reached:

1. Perforation of the infraperitoneal portion of the rectum results in fecal contamination of the cellular tissue of the infraperitoneal space. This space communicates with the retroperitoneal space posteriorly over the sacrum and this may result in fulminating and widespread sepsis behind the peritoneum.

2. Even when the perforation cannot be located, but there is presumptive evidence of its presence or potential development from contusion or infarct of the rectum as judged from the course of the missile and the presence of a large hematoma in the infraperitoneal space, an effective sigmoid colostomy should be established at once.

3. A sigmoid colostomy alone will not prevent infection of the infraperitoneal space, although the infection is likely to be less widespread and fulminating after contact with the normal intraluminal pressure is severed and gross contamination of the normally functioning bowel is avoided. In addition, the infraperitoneal perirectal space must be saucerized by coccygectomy and loosely packed.

4. Mere saucerization of the perirectal space, while life-saving and prophylactic against spreading retroperitoneal sepsis, is not, however, complete ideal treatment. Unless the perforation is located and closed, a persistent fistula may develop.

JOHN E. KIRKPATRICK, M.D.

Dixon, C. F., and Benson, R. E. Carcinoma of the Sigmoid and Rectosigmoid Involving the Urinary Bladder. *Surgery*, 1945, 18: 191.

At present, carcinoma of the sigmoid and rectosigmoid with distant metastasis is amenable only to palliative treatment. However, when local extension of the disease only is present, the condition is seldom inoperable. It therefore seemed advisable to the authors to point out some of the problems associated with carcinoma of the sigmoid and rectosigmoid involving the urinary bladder and to review their experiences with its surgical management. This study is based on 64 consecutive cases in which operation was performed by the senior author in the years 1931 to 1943, inclusive.

A small amount of secondary invasion of the urinary bladder by carcinoma of the sigmoid or rectosigmoid may give rise to no clinical or laboratory findings. More extensive involvement often produces distressing urinary symptoms and pyuria.

Of the 64 patients in the present series, 59 were males and 5 were females. The apparent infrequency of involvement of the urinary bladder in this condition in the female, in comparison with the male, is evidently attributable to anatomic differences in the pelvis. The ages of the 64 patients varied from 29 to 76 years, the average age being 55 years. In the majority of cases, carcinoma had been present for a long time, and it is therefore not surprising that many patients were in poor general condition.

Probably the first step in invasion of the urinary bladder by carcinoma of the sigmoid or rectosigmoid is an inflammatory attachment of the tumor to the peritoneal covering of the bladder. This situation sometimes is encountered at operation. In such a case the malignant process can be dissected from the urinary bladder without an opening into its lumen. The examination of small bits of tissue from the vesical wall at the site of attachment will reveal the presence or absence of residual carcinoma and will allay any doubt in the surgeon's mind as to whether the malignant process has been completely eradicated. The inflammatory reaction around a secondary malignant growth of the bladder is a phenomenon not only of the early stages but also of the later stages of the malignant disease. Often advanced carcinoma that has extensively infiltrated the wall of the bladder is surrounded by such a severe inflammatory reaction that it is difficult to determine, even at operation when the lesion is in full view and can be examined by the palpating hand, whether the reaction is primarily inflammatory or neoplastic.

When a large carcinoma in the sigmoid or rectosigmoid has extended to the urinary bladder and is surrounded by an indurated inflammatory reaction, the surgeon may be tempted to perform colostomy and to wait several weeks for the inflammation to subside before undertaking resection of the bowel. Undoubtedly this is often a valuable procedure, but the senior author recently has concluded that postponement of resection after the distal segment of colon has been defunctionalized will not, as a rule, appreciably diminish the inflammatory reaction if the malignant growth has penetrated completely through the wall of the bladder. In such instances the urine and the diseased condition of the bladder continue to "feed" the infection in spite of the use of urinary antiseptics. Therefore it has become the senior author's practice to resect such lesions primarily whenever the general condition of the patient warrants the procedure.

In 42 of the 64 cases in this series the condition was classified as operable. Two patients in the group who presumably had removable lesions died after colostomy. In the remaining 40 cases, resections were performed. In 19 of the 40 cases the

attachment to the bladder was of an inflammatory nature and removal of the tumor did not necessitate an opening into the lumen of the bladder. In the remaining 21 cases, portions of the full thickness of the vesical wall were removed. In 15 of these approximately a third or more of the organ was resected; in 6 cases smaller segments were resected. In most of the cases resection of the bowel was completed by end-to-end anastomosis. There were 7 operative deaths. Twenty of the 40 patients were living at the time of follow-up or for more than five years after resection.

Hayden, E. P.: The Surgical Treatment of Carcinoma of the Rectum. *N. England J. M.*, 1945, 233: 81.

Statistics on 198 cases of resection for carcinoma of the rectum are presented. In the presence of one or two metastases in the liver, or when the local growth, although extensive and perhaps abscessed, could still be removed, operation was completed in order to give relief, if not cure, in this unfavorable group of patients. Of 217 patients explored, only 19 presented a carcinoma so extensive that a radical procedure would have been foolhardy. One-stage abdominoperineal resection was performed in 131 cases. The other procedures carried out, in order of decreasing frequency, were two-stage abdominoperineal resection, anterior resection, Mikulicz resection, end-to-end suture, and tube resection.

A stay of from 3 to 5 days in the hospital before operation on the colon was usually an adequate period for general rest, preparation of the bowel, completion of laboratory work, and whatever measures seemed necessary to improve the patient as an operative risk. Unless contraindicated, pontocaine spinal anesthesia, which greatly facilitates the ease of operation, was used. The colostomy was opened in 1 or 2 days and an enema given on the fourth or fifth day; boric irrigations of the posterior wound were begun after removal of the posterior pack and continued until the discharge ceased. The average postoperative hospital stay of these patients was 3 weeks.

In the entire series there were 26 hospital deaths, a mortality of 13 per cent. The chief causes of death were pneumonia, sepsis, embolus, and obstruction. Although over 50 per cent of the deaths occurred following one-stage resection, this should not be considered an indictment of the procedure, since, actually, the number of deaths (14) was only 10 per cent of the number of single-stage resections (131), a mortality lower than that of the series as a whole. Of the 198 patients undergoing resection, 75 died later, in most cases of recurrent disease; 12 of them died of unrelated causes, and 96 are still alive. Of the 98 patients operated on over 5 years ago, 32, or 33 per cent, have survived without evidence of disease for from 5 to 14 years. The longest interval before death occurred from recurrent disease was 5 years and 5 months after operation.

JOHN L. LINDQUIST, M.D.

Mandl, F.: The Technique and Results of the Primary and Secondary Pull-Through Operations after Removal of Tumors of the Rectum and Rectosigmoid. *Surgery*, 1945, 18: 318.

Since the restoration of continence is of prime importance after the removal of tumors of the rectum and rectosigmoid, any radical operation which does not permit this possibility is regarded as imperfect. The techniques of the primary (Hochenegg) and the secondary (Weil) pull-through methods are described; the latter is accomplished by the artificial production of prolapse (Mandl) from the sacral anus and operation on the sacral hernia. The pull-through procedure may be used equally as well after sacral or abdominosacral radical operation. The method of Hochenegg holds the greatest promise of success for the restoration of continence after operations on the rectosigmoid.

Colostomy should precede the pull-through operation. Details are described. SAMUEL KAHN, M.D.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Ruffin, J. M., and Wise, B.: The Value of Plasma Vitamin-A Determinations in the Differential Diagnosis of Jaundice. A Preliminary Report. *Gastroenterology*, 1945, 4: 466.

It has been shown repeatedly that the plasma level of vitamin A is low in liver disease. This is to be expected since it is generally agreed that carotene is converted by the liver into vitamin A. Therefore, the authors present the hypothesis that if jaundice is due to common duct obstruction *without liver damage*, one would expect a normal vitamin A level in the plasma, whereas jaundice from a diffuse hepatitis should be accompanied by a low level of vitamin A in the plasma.

In every patient in the authors' series who was classified clinically as having acute hepatitis or "catarrhal jaundice," there was a significant lowering of the plasma vitamin A. Since a gradual rise in these levels coincided with clinical recovery, serial determinations of vitamin A may have definite prognostic value. There was no constant correlation between the vitamin A levels and other tests of liver function except the cephalin flocculation test, which was positive in every case.

Of the 10 patients who were found at operation to have obstruction to the common duct, 6 had no demonstrable evidence of liver involvement and had vitamin A levels which were either within or close to normal limits. The levels were definitely lowered in the remaining 4 patients, but in each case either the duration of the disease or obvious infection were factors which could readily have resulted in liver damage. Thus, it would seem that a patient with common duct obstruction of short duration, without evidence of liver involvement, probably will have a normal vitamin A level; whereas if the obstruction has been prolonged, or if there is evidence of biliary tract infection or metastases to the liver, the vitamin A

level may be reduced. On the other hand, patients having a diffuse hepatitis invariably will have a definite lowering of their plasma vitamin A, and it may well be that this procedure will afford valuable evidence in distinguishing between these two forms of jaundice. EARL O. LATIMER, M.D.

Eddy, J. H., Jr.: Methionine in the Treatment of Toxic Hepatitis. *Am. J. M. Sc.*, 1945, 210: 374.

Miller and Whipple have shown that there is increased sensitivity of the liver to toxins following protein depletion in dogs exposed to chloroform. Goldschmidt, Vars, and Ravdin, in their work on mice, pointed out the protective action of protein diets. Carbohydrate as a liver protector is generally accepted, and Miller and Whipple believe that its efficiency is primarily due to its sparing the protein stores.

Lately, interest has centered on the identification of the specific protein factor responsible for liver protection. Miller, Ross, and Whipple, in 1940, showed that methionine, and, to a less extent, cystine would protect the liver against injury if given before chloroform anesthesia—this protection was comparable to the feeding of a large protein meal. In 1942, they showed this same protection occurred even when the methionine was given 3 or 4 hours after chloroform anesthesia, but 6 hours after anesthesia, no protection occurred, presumably because all of the cells had been fatally damaged. Therefore, for methionine to be of any value, some viable liver tissue must be present. Clinically then, early treatment is essential if methionine is to be effective. Choline alone has been shown to be useless as a protecting agent, but, combined with cystine, it rivals methionine. Goodell, Hanson, and Hawkins, in 1944, poisoned dogs with mapharsen and demonstrated the effectiveness of methionine against this hepatotoxin.

It is believed by many that methionine protects the liver from damage primarily because of its sulfur content, since protein-depleted dogs are more completely depleted of sulfur. Heppel *et al.* showed that there was decreased resistance among protein-depleted animals to dichlorethane; but if they were fed methionine and choline, there was increased resistance to its toxic action. These dogs showed no evidence of hepatic lesions, and this suggested that the protective effect of methionine may not be dependent on the liver alone. To support this theory, the authors showed adrenal changes in some of their animals.

Gyorgy, in 1944, stimulated clinical interest in methionine. He outlined the progression of changes in animal livers on a protein deficient diet from fatty infiltration through necrosis to cirrhosis. He pointed out the presence of "ceroid" in the cirrhotic livers produced by dietary means, a product not seen in other forms of animal or human cirrhosis. He compares the kidney lesions simultaneously seen in cases of damaged livers on a dietary basis with the so-called hepatorenal syndrome in man. Gyorgy suggested that choline and cystine are needed for the synthesis of another substance that may be methionine. He recommends its use in the prevention and treatment of hepatic injury due to purely toxic as well as dietary factors.

The author, in reporting cases of carbon tetrachloride poisoning, noted that the severest cases all occurred in negro women with high fat and protein deficient diets. White women with the same job and adequate diets showed only mild toxic symptoms. A case report by Beattie *et al.*, of treating carbontetrachloride poisoning with methionine stimulated the author's study of its use in the treatment of hepatitis due to trinitrotoluene, and later other types of hepatitis and cirrhosis.

Since July, 1944, the author has treated 30 cases of acute toxic hepatitis with methionine. Most of them were due to T.N.T., and at least 10 patients were seriously ill. To date, there have been no fatalities as compared with the published mortality of from 30 to 35 per cent in T.N.T. hepatitis. Prior to the use of methionine the author treated 2 patients with T.N.T. hepatitis, 1 of whom died and the other has a prolonged illness. Many patients seen since then have appeared to be as severely poisoned as these first cases on admission.

The average length of hospitalization of the cases treated with methionine varied from 4 days to 7 weeks and averaged 13 days. The diagnosis was based on an analysis of the occupational exposure, physical examination, icteric index, and Hanger cephalin flocculation test, and urinalysis for urobilinogen and bilirubin. The daily urinalysis for urobilinogen and bilirubin is of value in following the patient's course. A decrease in the bile in the urine and an increase in urobilinogen is closely followed by a decrease in the icteric index. Below 20, this decrease is slow and often a value of from 10 to 12 persists for several months. The Hanger test never gives a false negative, and false positives are rare. The author does not believe that a reading of + or ++ is significant. This reading also returns to normal slowly and may not be negative for one or two months.

Almost all patients complained of dizziness, nausea, vomiting, weakness, and pain in the right upper quadrant. On physical examination they showed jaundice and palpable enlarged livers. There has been a preponderance of white males with this condition, although both colors and sexes are affected.

Treatment included bed rest, a high protein and carbohydrate diet and a low fat diet, multiple vitamin products, additional B complex vitamins, and the oral administration of methionine in doses of from 3 to 8 gm. daily. The average dose was from 3 to 4 gm. in a day, but in 2 cases with more jaundice, the dose was increased to 8 gm. daily and the patients were fed with a duodenal tube. Both cases improved markedly after 48 hours.

The author then presents abstracts of 3 of the more severe cases of T.N.T. toxic hepatitis. Two of these cases showed such remarkable improvement after the dose was increased that the author believed

the usual dose of methionine might be inadequate and that from 6 to 8 gm. daily should be given to all seriously ill patients. The author gave 12 gm. a day to 1 seriously ill patient without evidence of toxic reactions. The usual course is to start the patient on smaller doses and increase the amount if clinical improvement is not soon apparent.

Several cases of acute carbon-tetrachloride hepatitis, as well as 2 cases of epidemic hepatitis, all of which were treated with methionine, were improved. The treatment of some cases of cirrhosis of the liver has been started, but conclusions cannot be drawn from the few cases in which treatment has been completed. It is apparent, however, that methionine or choline plus cystine will be of value in early cirrhosis and in controlling episodes of acute activity in older cases. Little help can be given to the far advanced cases as the functional unit has been irreparably embarrassed by the laying down of scar tissue.

ROBERT R. BIGELOW, M.D.

Blumberg, N., and Zisserman, L.: Acute Suppurative and Gangrenous Cholecystitis. *Am. J. Surg.*, 1945, 70: 38.

Much has been written about acute cholecystitis. Experimental work suggests that the pathology is usually a mechanical obstruction of the cystic duct with edema and ischemia of the wall, followed by secondary infection. The question of immediate or delayed surgery in acute cholecystitis has long been controversial. Each policy has some disadvantages: the former commits the surgeon to operate in a septic edematous field and the latter submits the patient to the dangers of a lesion that may be progressive. Acute cholecystitis can resolve itself spontaneously without surgical interference, or it may progress and terminate in gangrene or empyema. The authors present this article as a study of advanced gall bladder disease—empyema and/or gangrene with or without perforation.

A series of 82 cases were examined in the period from 1929 to 1944 at the Philadelphia Jewish Hospital. Thirty (37%) of these cases were males averaging 53.3 years of age. The 52 females averaged 55.9 years, and the ages of all ranged from 29 to 72. The authors compare these figures with those in other reports published in the literature.

Fifty-four patients (66%) gave a history of symptoms referable to the biliary tract prior to the present attack, and only 6 definitely denied such symptoms. Many gave a history of gall bladder disease extending over a great many years.

The interval between the onset of the present attack of pain and its termination by operation or antecedent demise averaged 12 days for the men and 13½ days for the women. At this hospital, it was the policy to operate on acute cases only if it was deemed necessary because of a progressive lesion, and to wait for subsidence of the acute symptoms whenever feasible.

Abdominal pain in this series originated (1) in the right upper quadrant, (2) in the epigastrium, or (3) as generalized abdominal pain. Fifty per cent of the patients reported radiation, usually to the back, right shoulder, or across the abdomen. Abdominal distention was not often noted, but marked tenderness, localized to the right upper quadrant, was usually present. Nine patients reported a history of chills and fever with the present attack, and nausea, vomiting, or both were present in most cases. Only 10 specifically denied either of these symptoms. No consistent change in bowel habits was noted. Jaundice appeared in only 10 per cent of the patients during the present attack and only 6 per cent had a history of previous jaundice.

An enlarged mass in the upper right quadrant was definitely palpable on admission in 38 cases (46.3%). There was definitely none palpable in 35. The preoperative temperature was usually a sustained elevation, sometimes as high as 103 degrees and other times barely elevated. A moderate temperature averaging about 101 degrees was usual. Blood pressure readings on admission varied widely but averaged 134/79 for men and 144/80 for women.

The average white blood count on admission was 15,660 cells per cubic millimeter for men and 15,870 for women (81.3% and 80.2%, respectively, were neutrophils). A great many of the patients showed a fall in the white blood count prior to operation, the males averaging 14,060 with 80.9 per cent neutrophils and the females 13,950 with 76.3 per cent neutrophils, a day or so preoperatively. Since these cases were progressive with probably nonresolving lesions, this did not indicate an improvement in the pathological process. The red cell counts were quite normal in most cases, with the exception of some concentration due to dehydration.

Fasting blood sugar tests were made on 64 patients, 13 of whom were known diabetics. Levels less than 100 mgm. per cent were obtained in 20 cases (39% of the nondiabetic group). Nineteen (37% of the nondiabetics) had levels between 100 and 120. The remaining 12 nondiabetics had levels above 120, 4 over 150. The somewhat elevated blood sugar levels were attributed to concomitant coronary occlusion, intravenous glucose therapy shortly before the test, and unrecognized diabetes mellitus. The authors believe there was nothing to suggest any tendency to produce an elevated fasting blood sugar as is known to occur in acute coronary occlusion. Blood urea nitrogen determinations in 63 cases were within normal limits in most cases.

An attempt to correlate the severity of the disease with clinical and laboratory data was considered admirable so the records of 21 cases of perforated gall bladders were studied separately. These cases represented 25 per cent of the entire group. They were not necessarily all recent perforations, some being well encapsulated by adhesions of omentum, and only 3 were associated with widespread peritonitis. Rupture into the duodenum occurred in 1 case.

The ages of the 9 men patients averaged 61.8 years and those of the 12 women 57.1 years, and nearly all

of the patients had an antecedent gall bladder history. Only 3 denied any prior biliary dysfunction. The average duration of the recent acute attack was 11 days for the females and 8 days for the males. The acuteness of the average perforated case was noted and earlier interference practiced, 8 cases being operated within 7 days of the acute onset and 5 within 3 days. One-third of this group had a palpable mass in the gall bladder region on admission to the hospital.

The pain of onset was diversified and more widespread, and the right upper quadrant pain and tenderness were more severe and more often present than in the general group. Two-thirds of the patients had extreme tenderness, abdominal rigidity, nausea and vomiting. The remaining one-third consisted of cases in which the perforation was long standing with localized chronic abscess formation. These had very little tenderness or rigidity.

In the perforated group the admission white count averaged 16,600 with 82 per cent neutrophils. Three cases had counts in excess of 26,000.

Surgery of the gall bladder was performed in 73 cases (89% of the entire series). The operation varied from simple incision and drainage to complete excision, according to the seriousness of the case. In approximately one-half of the operative cases, cholecystectomy was done. In the perforated group only 3 had cholecystectomies, while 14 were treated by simple incision and drainage.

Spinal anesthesia was used in 59 (81%) of the operations. Supplementary anesthesia of nitrous oxide oxygen, ether, or pentothal was used in 7 cases. Nine were done under local and 5 under general anesthesia, and 14 of the perforated group were done under spinal and 3 under local anesthesia.

Stones were found in 65 patients (79%). In 11 cases they could not be definitely ascertained. Six cases definitely had none. Two-thirds of the perforated group had stones, and only 1 definitely did not. The examination was not complete in the remainder.

Of the entire group of 82 patients, 20 died during their hospital stay. This group averaged 60.5 years of age. Of the 73 operative patients, 11 died postoperatively, a mortality of 15.1 per cent. Twelve of these patients died as a direct result of biliary disease, and 4 of causes uninfluenced by and unrelated to biliary disease.

In spite of the lessened trauma attending gall bladder incisions, the mortality for this procedure was more than twice as much as for excision. For the most part the patients were poorer risks. In the mortality group, the average interval between the onset of the attack and its termination by operation or prior demise was 10.5 days. The white count averaged 16,300 with 81.8 per cent of neutrophils.

There were 13 diabetic patients in the series (15.9% of the total), which correlates with the idea that diabetics have twice the tendency to develop gall stones. The average age was 61.4 years, and 5 of these patients were males. One-half were operated on within a week, and 9 had palpable gall bladders preoperatively. The average white count was 15,200 with 81 per cent of neutrophils. Three cases perforated, an incidence of 23 per cent. All these facts show a similarity between diabetic and nondiabetic cases. Eleven diabetics (85%) were operated on and 10 had gall stones. Two cholecystostomies and 3 cholecystectomies were done under spinal anesthesia. Seven diabetics (54% of the diabetics) died; these deaths made up 35% of the total mortality. All of these deaths were due directly or indirectly to biliary disease.

The presence of gall stones in cases of acute cholecystitis in a far greater incidence than chance alone suggests, points to a common etiology or to the fact that stones may play some role in the acute process. Since most patients have been suffering more or less from chronic gall bladder disease before developing an acute and dangerous condition, it may be wise to consider the prophylactic approach to the problem, i.e., the desirability of removing the gall bladder in all symptomatic cases of chronic cholelithiasis as a curative for symptoms and a preventive of complications. Certainly every case of acute cholecystitis that is allowed to subside should be operated on after a reasonable interval to preclude future more serious attacks.

The authors believe that the severity of gall bladder disease depends directly upon the chronicity of a gall bladder condition. The diminished vascularity with increasing age and the fibrosis accompanying attacks may favor widespread serious damage with sudden vascular occlusion.

It is recognized that it is not possible to correlate the severity of the signs and symptoms with the degree of disease present in any given patient.

Although there is a marked tendency for diabetics to form stones, there is no unusual tendency for the diseased gall bladders in these cases to progress to suppuration or gangrene. The exceptionally higher mortality in these cases suggests that tissue destruction in the gall bladder is tolerated as poorly as elsewhere. Diabetic patients should not only be considered poorer risks for surgery in advanced gall bladder disease, but probably deserve more prophylactic surgery. ROBERT R. BIGELOW, M.D.

Osler, G. F., and Dow, R. S.: Variations and Anomalies of the Biliary Duct System and Its Associated Blood Supply. *West. J. Surg.*, 1945, 53: 316.

Dissection was carried out on 30 cadavers to show variations in the extrahepatic biliary duct system and cystic artery. The cystic and hepatic ducts may join at an acute angle (Fig. 1), or follow a long straight or spiral tortuous course (Figs. 2 and 3). Accessory hepatic ducts were found in 6 of the 30 cadavers. They may unite with the gall bladder, with the cystic duct (Fig. 4), with the right hepatic duct (Fig. 5), with the common hepatic duct, or come into the angle at the junction of the cystic and common hepatic ducts (Fig. 6). Frequent variations

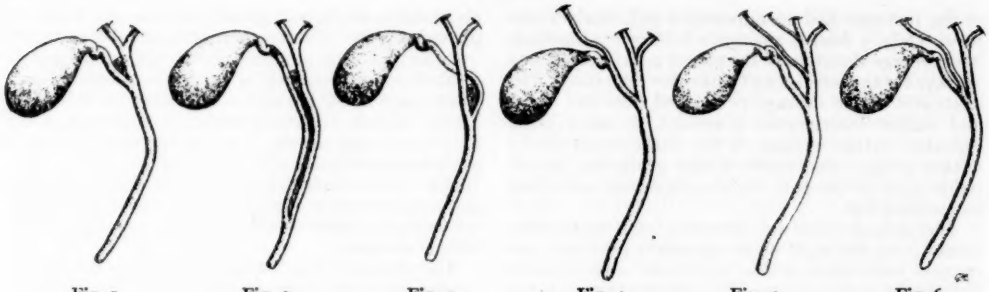


Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5. Fig. 6.

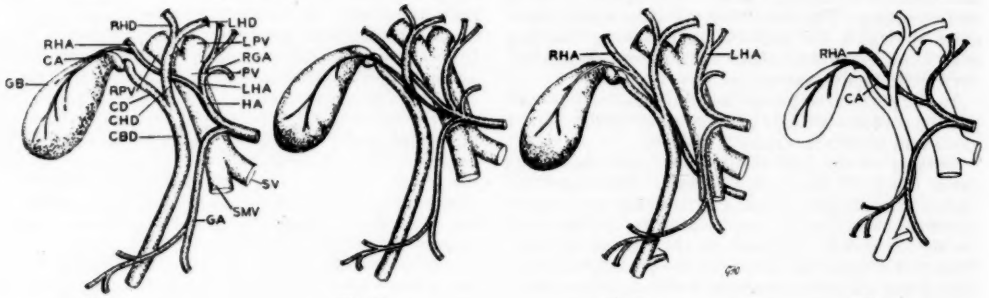


Fig. 7. Fig. 8. Fig. 9. Fig. 10.

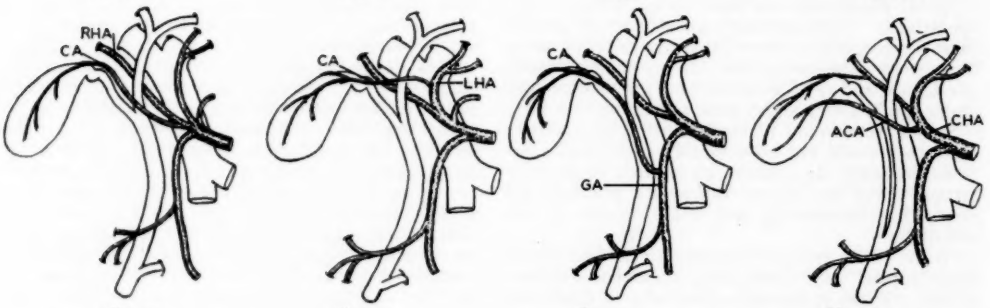


Fig. 11. Fig. 12. Fig. 13. Fig. 14.

Figs. 1 to 14. Variations in the extrahepatic biliary duct system and cystic artery. ACA, accessory cystic artery; CA, cystic artery; CBD, common bile duct; CD, cystic duct; CHD, common hepatic duct; GA, gastroduodenal artery; GB, gall bladder; HA, hepatic artery; LHA, left hepatic artery; LHD, left hepatic duct; LPV, left branch of portal vein; PV, portal vein; RGA, right gastric artery; RHA, right hepatic artery; RHD, right hepatic duct; RPV, right branch of portal vein; SMV, superior mesenteric vein; and SV, splenic vein.

occur in the common hepatic, and right and left hepatic arteries.

The cystic artery, a very important one surgically, showed a good deal of variation. It may be normal, i.e., arise from the right hepatic to the right of the common hepatic duct (Fig. 7), but may originate behind (Fig. 10), or to the left of the duct. It may come from the left hepatic artery (Fig. 12) or from the gastroduodenal artery (Fig. 13). Accessory cystic arteries are rare. One was found arising from the hepatic artery (Fig. 14); another from the left hepatic artery.

The amount of variability in the extrahepatic duct system and its associated blood supply makes it of the utmost importance that the surgeon secure satisfactory visualization of these structures at the time of surgery.

The 14 figures here included show the various findings of this study.

RICHARD J. BENNETT, JR., M.D.

Van Gelderen, C.: Transpapillary Duodenal Drainage of Hepatic Duct (Die transpapillaere duodenale Hepatikusdraenage). *Acta chir. scand.*, 1944, 90: 27.

Insertion of a T-tube into the common duct is fraught with the danger of a secondary cicatricial stenosis, the drainage leads to a considerable loss of fluids and ions, and in addition, the absence of bile in the intestines interferes with the resorption of fats. Moreover, the loss of undigested fats impairs the absorption of proteins and calcium. Finally, a deficiency of the fat-soluble vitamins A, D, and K may be the sequel of the external drainage of bile.

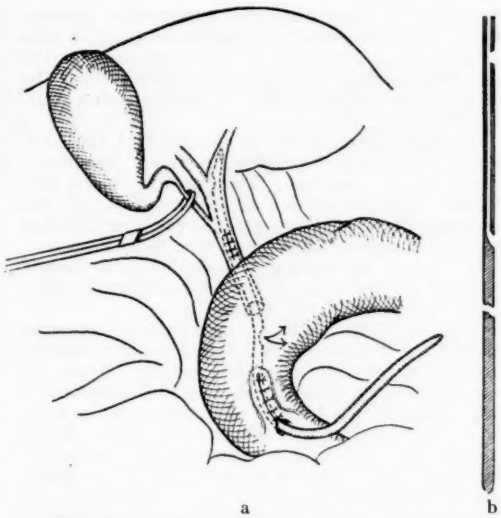
For all these reasons it has been suggested that external drainage of the common duct be replaced by choledochoduodenostomy. However, such anastomosis facilitates the development of ascending cholangitis, especially because the new stoma is deprived of a sphincter. Therefore, this procedure should be employed only if the papilla cannot be stretched and if one suspects small stones in the hepatic duct.

A primary closure of the common duct is not advisable in the presence of acute cholangitis as a rule. The primary closure is certainly contraindicated if an induration of the head of the pancreas compresses the outlet of the common duct. In such instances an internal drainage of bile is desirable. A rubber drain buried in the common duct is not always expelled through the duodenum and may be responsible for a recurrent cholangitis or formation of stone.

To obviate these drawbacks, Voelcker introduced a drain through the common duct into the duodenum and exposed the tip through a transduodenal incision; the drain was pulled through the opening in the duodenum and carried to the outside through a Witzel's fistula. The drain could be removed within a few days without leakage of the bile or duodenal contents.

The author modified Voelcker's procedure in the following manner: bougies are introduced through a choledochotomy to dilate the papilla, and a rubber drain is carried from the common duct into the duodenum through the papilla. An incision is made in the duodenal wall over the protruding tip of the drain and a lateral opening is made in the tubing to establish an internal duodenal bile drainage. The drain is pulled and carried through a Witzel's fistula. The incision in the common duct is closed with catgut and the gall bladder is removed. The drain is brought out through a stab wound in the abdominal wall and clamped with a hemostat. Approximately one week after the operation the drain can be removed. In this manner acute cholangitis is successfully combated without external bile drainage. The icterus does not disappear as promptly as after external drainage but, on the other hand, dehydration is avoided and the general condition of the patient improves rapidly.

Only the part of the drain directed from the lateral opening in the duodenal portion toward the liver must be hollow, while the remaining portion of the drain may be solid which avoids the necessity of a clamp.



a b

Fig. 1. a, Diagram of procedure. b, Special drain shortened by interruption.

The drain may be used not only in infected cases accompanied by high temperature but also in all cases in which a primary suture of the common duct does not appear dependable. The method is applicable also in patients with a chronic inflammatory induration of the head of the pancreas in whom it may replace a T-tube or a permanent anastomosis. The author's drain may be employed also in reconstruction of the biliary ducts and after choledochoduodenostomy. JOSEPH K. NARAT, M.D

Peterson, L. W., and Cole, W. H.: Chronic Sclerosing Pancreatitis Causing Complete Stenosis of the Common Bile Duct. *Arch. Surg.*, 1945, 51: 15.

Peterson and Cole wish to call attention particularly to the type of chronic pancreatitis associated with diffuse atrophy and fibrosis throughout the entire gland. Such a process may produce surprisingly little physiological or mechanical disturbance. However, jaundice may develop and become permanent because of the severity of the sclerosing process involving the common duct.

While this condition is not common, the seriousness of destruction of the terminal end of the common duct by the progressive pancreatitis is sufficiently well appreciated that every effort should be made to treat acute pancreatitis early and eliminate it if possible. The etiological factor in the production of the usual type of acute edematous pancreatitis appears to be strongly related to cholelithiasis; the

fact that in some cases the pancreatitis subsides after cholecystectomy is suggestive proof of this relationship, but it is by no means conclusive, since not infrequently cholecystectomy fails to stop the pancreatitis. Occasionally it develops after cholecystectomy.

Localized pancreatitis in the head of the pancreas, simulating carcinoma, is rather commonly observed by surgeons. The process, which frequently produces complete obstruction of the common duct, usually subsides so completely within a few weeks or months that all symptoms disappear. The surgeon too often attributes the entire success of relief of obstruction to the short-circuiting operation, i.e., cholecystenterostomy.

Complete permanent obstruction of the common duct due to chronic pancreatitis is a difficult lesion to treat, but presents much less difficulty than obstruction due to complete absence or destruction of the common duct, because the remnant of the common duct simplifies the operative procedures. When the obstruction is due to localized pancreatitis involving only the head of the pancreas, the prognosis for spontaneous complete recovery appears to be much better than when a generalized chronic sclerosing pancreatitis is producing a complete obstruction of more than transient type. Therefore, the customary operation of cholecystenterostomy for local pancreatitis in the head of the pancreas appears to be a logical procedure, particularly since the anastomosis will frequently remain open for only a few months, at the end of which time the pancreatitis usually subsides completely with relief of the obstruction. The operation of cholecystenterostomy has one serious disadvantage, namely, the resulting development of cholecystitis and hepatitis which has been shown experimentally by Wangensteen and others.

It is extremely difficult to differentiate chronic pancreatitis localized to the head of the pancreas and producing temporary complete obstruction of the common bile duct from carcinoma of the head of the pancreas without a deep biopsy from the lesion. In the even more rare type of diffuse chronic sclerosing type of pancreatitis, operative therapy must be directed at establishing a permanent, nonstenosing communication between the suprapancreatic portion of the common bile duct and the intestinal tract. In addition, the regurgitation of food and intestinal secretions must be prevented as much as possible.

Of the several operative procedures that have been described, each has some individual merit. The procedure of choice would be an anastomosis of the proximal stump of the common duct to the duodenum or an anastomosis of the proximal end of the common bile duct to the blind end of a single arm of jejunum, utilizing the Roux principle. Into this blind loop of jejunum, through which food does not ordinarily pass, valves, as previously described, are placed to help prevent regurgitation of food. A side-to-side anastomosis has the added advantage of allowing function of the terminal duct to be resumed if the pancreatic lesion should clear sufficiently to allow relief of the obstruction. If the terminal end of the duct is hopelessly destroyed, the duct may be mobilized and either a transplantation into the duodenum or an anastomosis performed. If the latter procedure is used, a vitallium tube may or may not be used, according to the size of the common duct.

BENJAMIN GOLDMAN, M.D.

Maxeiner, S. R., and Bundy, H. E.: Islet Cell Tumors of the Pancreas. *Surgery*, 1945, 18: 171.

The relationship of islet-cell tumors of the pancreas to hypoglycemia is now well recognized and there have been an increasing number of such cases reported in the literature of the last decade. In Whipple's recent review on 149 cases of islet-cell tumor showing hypoglycemia, there were 106 which were considered benign, 28 questionably malignant, and 15 definitely malignant with metastases to the liver.

The tumors may be single but two or more have been found in approximately 10 per cent of the reported cases. They are usually in the body and tail of the pancreas but may be in the head of the gland. They are dark red or purplish in color and are firmer than the surrounding tissues. Their size varies, but it averages between 1 and 2 cm. in diameter. The benign tumors are encapsulated. They may show signs of degeneration, but in some cases they are definitely calcified. Microscopic sections of the cells are typical of islet cells.

The symptoms of islet-cell tumors may be hunger, faintness, perspiration, and vertigo; or, in addition, there may be signs related to the nervous system. Wilder has classified the nervous symptoms into three groups; (1) disturbances of the sympathetic nervous system with dizziness, nausea, pallor, and sweating; (2) disturbances of the central nervous system such as convulsions with tonic and clonic contractures of the extremities; and (3) psychic disturbances with anorexia, maniacal seizures, mental confusion, and coma.

These attacks occur most frequently during periods of fasting or overfatigue, at which times the blood-sugar levels are lowest. There is frequently a rapid response to the ingestion of glucose either by mouth or parenterally. Whipple has presented a triad for differentiation of islet-cell tumors: (1) attacks of insulin shock coming on during fasting or overfatigue; (2) blood-sugar findings of 50 mgm. per cent or less; and (3) prompt relief from the ingestion of glucose. When this triad is present the possibility of islet-cell tumor due to oversupply of insulin must be seriously considered. The differential diagnosis of hypoglycemia is a difficult diagnostic problem. The influence of other glands such as the thyroid, pituitary, adrenals, and liver on the carbohydrate metabolism must be considered.

Surgery is indicated in the severely ill patients who have not responded adequately to palliative measures. The transverse or inverted-T incision is par-

ticularly suited to the operation on the pancreas. The gland may be approached through the gastrohepatic or gastrocolic omentum. If most of the greater curvature of the stomach is freed and reflected upward, practically the entire anterior surface of the pancreas can be visualized. Islet tumors may be quite obvious or not visible at all. Removal of the obvious adenoma usually is followed by complete relief of the symptoms. However, these masses may be multiple and additional tumors should be removed when present. When no tumor can be found the procedure is open to debate. The surgeon may postpone further surgery until the tumor is sufficiently developed to permit its location and removal, or an adequate portion of the pancreas may be resected with the idea of reducing the secretion of insulin, which treatment is similar to that of hyperthyroidism. This is done with the hope that the removed segment of gland may bear the offending tumor.

SAMUEL J. FOGELSON, M.D.

Cole, W. H., and Reynolds, J. T.: Resection of the Duodenum and Head of the Pancreas for Primary Carcinoma of the Head of the Pancreas and Ampulla of Vater. *Surgery*, 1945, 18: 133.

After describing the various operations for primary carcinoma of the head of the pancreas reported in the literature by Whipple (1941), Hunt (1941), Orr (1942), Brunschwig (1943), and Child (1944), the authors submit their procedure, which they now have done on 5 patients.

A long midline or modified transverse incision is made in the upper abdomen in order to determine whether or not the tumor can be dissected free from the superior, mesenteric, and portal veins. The common duct is next divided as far distally as possible. The gastroduodenal and inferior pancreaticoduodenal arteries are then ligated. The pylorus and distal duodenum at the ligament of Treitz are then divided. Then a long loop of jejunum is brought up for an end-to-side gastrojejunostomy. Into this long loop of jejunum the common duct is transplanted, as much distance as possible being left between the site of transplantation and the gastrojejunostomy in order to minimize contamination or exposure to the food stream. The cut end of the pancreas was not transplanted into the intestine in this series of patients because "to date, very little ill effect has been observed by the various authors reporting on this subject, following complete closure of the pancreatic stump."

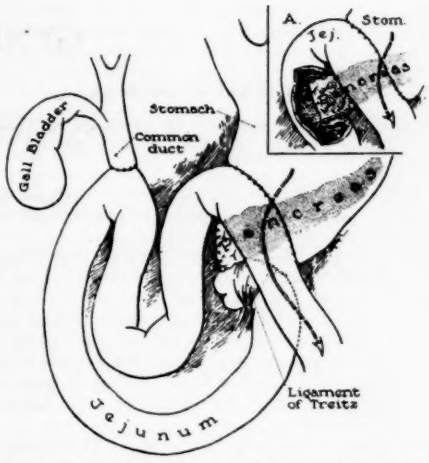


Fig. 1. Technique of the one-stage resection of duodenum and head of the pancreas adopted after trial with several different types. Note that the common duct is transplanted proximal to the gastrojejunostomy so that the food stream will not pass over it but will pass downward (assisted by gravity) instead of upward and over the transplanted duct as in some operations recommended.

Insert shows an alternate procedure of transplanting the cut end of the pancreas into the jejunum. The proximal loop of jejunum is left long to make room for transplantation of the common duct and, if desired, also the stump of the pancreas; however, it need not be so long if transplantation of the stump of the pancreas into the jejunum is not done or contemplated.

It is advisable to insert a drain down to the stump of the pancreas because a pancreatic fistula develops so commonly in spite of efforts to ligate the pancreatic duct and close the stump of the pancreas with nonabsorbable sutures.

One of the first 5 patients operated upon died, but as yet insufficient time has elapsed since surgery to determine the prospects of cure.

SAMUEL J. FOGELSON, M.D.

GYNECOLOGY

EXTERNAL GENITALIA

Thomas, G. B.: A Series of 40 Cases of Vesicovaginal Fistula. *J. Obst. Gyn. Brit. Empire,* 1945, 52: 262.

The author reports his experiences with 40 cases of vesicovaginal fistula. Special attention is given to a unique flap-splitting operation.

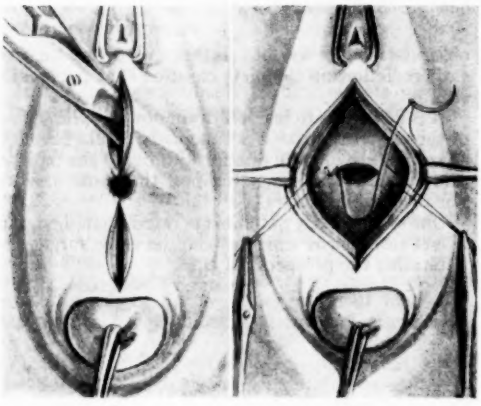
Vesicovaginal fistulas are classified, according to their situation, as juxtacervical, midvaginal, or juxtaurethral. In the 40 cases there were 18 juxtacervical, 5 midvaginal, and 17 juxtaurethral fistulas.

The results of their treatment are given, and it is shown that the juxtacervical and midvaginal fistulas were all operable by the flap-splitting method, and that all but one which were operated upon healed at the first attempt.

By contrast the results in the juxtaurethral fistulas were less successful, only 8 of 14 cases which were submitted to operation being cured.

A technique for the flap-splitting operation is described and illustrated.

An incision is made from below upward to the fistula through the vaginal skin, and then from the fistula upward to the cervix (Fig. 1). The depth of the incision is the same as for colporrhaphy. The points of a closed pair of Mayo's scissors are then thrust into the fascial space between the bladder and the vagina, which are then easily separated by opening the blades of the scissors, again as in colporrhaphy. Finally, the bladder and the vagina are held together only by the adherent margins of the fistula. All around, the bladder and the vagina have been cleanly separated in a plane of cleavage easily found by this approach from a distance. In the case of juxtacervical fistulas the incision above the fistula toward the cervix is made transversely across the front of the cervix, between it and the fistula, and it is then curved on each side laterally toward the fornices.



1. 2.

Fig. 1. Both incisions have been made, and the scissors are separating the bladder from the vagina.

Fig. 2. The fistula is free and the bladder has been mobilized as far as is desired. The vaginal flaps are held back by tissue forceps. Traction sutures hold the bladder steady, and the suturing of the fistula has begun. In practice the suture is held at the correct tension by an assistant, but this has not been shown.

It is often necessary to mobilize the bladder from the front of the cervix in addition. As a general rule, it is easier to suture the bladder horizontally, since by this means the best advantage may be taken of the loose bladder (Fig. 2).

The author uses only very fine chromicized catgut, on atraumatic needles when there is room to use them, and closes the gap with a simple continuous suture, about 12 stitches to the inch. After each stitch the catgut should be gently pulled to the right tension and kept at this tension by the assistant. It is important also to start and to finish the suture at least ⅛ inch from the edge of the fistula, so that there may be no leakage from the ends of the suture line. The suture should pass through the bladder musculature down to, but not through, the mucosa. Sometimes after the suture line is completed there remains plenty of loose bladder wall, and there is little difficulty in passing a second suture line Lembert fashion. The infolding suture is not essential, however. Throughout the operation each movement must be deliberate.

Then the vaginal mucosa is sutured. There may sometimes be difficulty in making the vaginal flaps meet to cover over the repair in the bladder. The catheter is sutured to the labia minora. The patient does not experience any pain from this unless she tries to pull the catheter out. Self-retaining catheters have not been used.

The vagina is firmly packed with gauze soaked in 1 in 1,000 acriflavine, which is removed after 24 hours.

The main point of the after-care is to ensure that the bladder remains empty.

On the twelfth day the catheter is removed and the patient is then encouraged to pass water every 2 hours for 5 or 6 days, and thereafter only when she has the inclination.

The view is advanced that the repair by the abdominal route is probably only rarely necessary. It was not required in this series.

It is suggested that transplantation of the ureters should rarely be required and should be avoided if possible.

Classical cesarean section in suitable circumstances is advocated in cases of pregnancy following a successful repair. DANIEL G. MORTON, M.D.

Danforth, W. C.: Vaginal Hysterectomy in the Management of Descensus Uteri. *Am. J. Obst.*, 1945, 50: 376.

In 160 of a little more than 600 vaginal hysterectomies, the operation was done for descensus of greater or less degree.

In 1 case death occurred. The patient was a woman in whom the protrusion was about 5 or 6 cm. She came through the operation well but got out of bed the first night and was controlled with some difficulty. She developed pelvic inflammation and shortly thereafter pneumonia. The latter was the determining cause of death.

Vaginal surgery requires a definite knowledge of the anatomy of the region in which the procedure is carried out. It also demands a familiarity with the technique of the operations which are done in this field. The specialist in pelvic surgery should be familiar with both the anatomy and technique, for the results of operations for descensus done from below are so much better than those following abdominal procedures that the latter should give way entirely. The safety of the operation done from below is greater and this fact should weigh heavily in the choice of procedure. It is the author's opinion that vaginal hysterectomy, rather than the procedures of the Manchester type, particularly in cases of extreme descensus, is the operation of choice. In cases in which the descensus is of moderate degree, either will serve. As in many patients the uterus has passed its usefulness, and especially inasmuch as the cervix is often unhealthy, removal of the uterus has a much larger field of usefulness than the alternate procedure.

EDWARD L. CORNELL, M.D.

MISCELLANEOUS

Abarbanel, A. R., and Leathem, J. H.: Studies in Amenorrhea, Oligomenorrhea, and Anovulomenorrhea. The Effect of Equine Gonadotropin upon the Establishment of Cyclic Menses and Ovulation. *Am. J. Obst.*, 1945, 50: 262.

Twenty-two patients with clinically hypofunctional ovarian activity were studied. These included 3 with primary amenorrhea, 11 with secondary amenorrhea, 8 with oligomenorrhea, and 1 with cyclic anovulomenorrhea. Adjuvant therapy with equine gonadotropin was instituted in these cases, the amounts varying from 400 to 4,000 units.

This hormone failed to establish menstruation in 3 cases of primary amenorrhea.

Of the 11 cases of secondary amenorrhea, ovulation was apparently stimulated in 2 although the result in 1 was open to serious question. Only 1 patient continued to have regular menses.

In the 7 cases of oligomenorrhea, the equine gonadotropin apparently restored cyclic menses in 1 case but failed to stimulate an ovulatory response in any.

In the 1 case of regular anovulomenorrhea, equine gonadotropin was ineffectual.

Nine of these 22 patients were later "salvaged" with an adequate diet and, usually, thyroid extract.

Clinically, equine gonadotropin proved to be a rather ineffectual stimulant to the abnormally functioning or hypofunctioning human ovary as far as the restoration of normal cyclic metabolism and the reappearance of regular menstrual rhythm was concerned.

Equine gonadotropin produced similarly poor results in stimulating an ovulatory response in patients with clinically hypofunctioning or abnormally functioning ovaries.

The principle of heterogenous substitutive therapy with equine gonadotropin may yield far greater harm than any temporary good. The possible harmful results of therapy with equine gonadotropin are (a) a gonadotoxic effect on the ovary, as evidenced by abnormal stimulation or marked delay in the appearance of the next menses, (b) the development of antagonistic (antigonadotropic?) substances with neutralization of subsequent injections of equine gonadotropin, (c) the development of allergic manifestations, which may be severe in spite of negative skin tests, and (d) the sensitization of the patient to other as yet unknown components of horse serum.

The principle of physiological stimulative therapy by means of a nutritionally balanced diet and desiccated thyroid extract is far more rational and far more efficacious both on theoretical considerations and with regard to the clinical results obtained.

EDWARD L. CORNELL, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Berman, W.: Congenital Absence of the Sacrum and Coccyx Complicating Pregnancy. *Am. J. Obst.*, 1945, 50: 447.

Roentgenograms of the pelvis of a 20 year old primipara at term showed a single fetus with its back to the left and the small parts to the right. The head was above the pelvic inlet and ballotable on palpation above the brim of the pelvis. The head appeared to be full term in size. The pelvic inlet was asymmetrical. The vertebral column was straight and terminated at the junction of the last lumbar vertebra and the pelvic girdle. There were two marked depressions at the site of the posterior superior spines of the ilium. There was almost a complete absence of the intergluteal fold, and the subcutaneous tissue and muscle formed a partially loose apron over what would normally be the sacrum.

The uterus responded to labor like any other normal uterus. Contractions were regular and of sufficient strength to require the use of some analgesia. The cervix dilated but there was no descent of the head.

After 24 hours of active labor without progress, a low classic cesarean section was done. The infant died shortly after delivery. Autopsy revealed that it had a congenital heart lesion and complete atelectasis of all lobes of the lungs. A roentgenogram failed to reveal any abnormality of the bony structure of the infant's pelvis.

EDWARD L. CORNELL, M.D.

Chesley, L. C., and Williams, L. O.: Renal Glomerular and Tubular Function in Relation to the Hyperuricemia of Pre-Eclampsia and Eclampsia. *Am. J. Obst.*, 1945, 50: 367.

Simultaneous measurements were made ante partum of the serum clearances of insulin, urea, and uric acid in 10 normally pregnant women near term, and in 10 women with pre-eclampsia and eclampsia. In all but 2 of the normal women, the tests were repeated postpartum.

In pre-eclampsia and eclampsia, the uric acid clearance is reduced. In this series, the diminution averaged 50 per cent. On the average, the reduction in uric acid clearance depends equally upon 2 factors, viz., (1) a decrease in the rate of glomerular filtration, and (2) an increase in the tubular reabsorption of uric acid from the glomerular filtrate. The increased tubular reabsorption of uric acid is the more general of the 2 factors.

Published data of other workers have been reinterpreted to support these conclusions. The diminution in uric acid clearance appears adequate to explain the hyperuricemia of pre-eclampsia and eclampsia.

EDWARD L. CORNELL, M.D.

NEWBORN

Leonard, M. F.: Hemolytic Disease of the Newborn (Erythroblastosis Fetalis). *J. Pediat.*, S. Louis, 1945, 27: 249.

Fifty-five cases of hemolytic disease of the newborn treated at the New York Hospital, New York, in the 6 years from 1938 to 1944, are summarized. The clinical picture was extremely varied; jaundice, anemia, the degree of erythroblastemia, and hemorrhagic manifestations varied independently. A high incidence (44 per cent) of nonspecific diarrhea was noted. The effects of transfusion with Rh-positive, Rh-negative blood, and bank blood not typed for the Rh factor were compared. The immediate results following the transfusions in raising the hemoglobin and improving the clinical condition were equally good, but Rh-negative blood transfusions resulted in a better sustained rise in hemoglobin, fewer reactions, and lower mortality. Nineteen infants died, a mortality of 34 per cent. One of the chief causes of death was hemorrhage.

Jaundice out of proportion to, or in the absence of, anemia was attributed to impaired liver function. This theory was supported by the fact that low prothrombin levels responded poorly to vitamin K administration, by the pathological findings of fatty degeneration and necrosis of the liver, and the evidence obtained from the literature.

The necessity for immediate transfusion in the presence of normal blood levels was questioned, and reasons were given for delaying transfusion until anemia impends. Plasma infusions were preferred in this type of patient.

The prominence of hemorrhagic tendencies in patients with hemolytic disease of the newborn was emphasized and its relation to low prothrombin levels demonstrated.

Administration of vitamin K to donors of Rh-negative blood was suggested as a means of raising the prothrombin levels of affected infants.

CHARLES BARON, M.D.

Miller, H. C.: The Effect of the Prediabetic State on the Survival of the Fetus and the Birth Weight of the Newborn Infant. *N. England J. M.*, 1945, 233: 376.

One of the outstanding characteristics of pregnancies in diabetic mothers is the high fetal and neonatal mortality rate. In addition, in some infants born to diabetic mothers there are striking somatic and visceral changes, including an increased birth weight, cardiomegaly, hyperplasia of the islands of Langerhans, excessive extramedullary erythropoiesis, hyperplasia of the adrenal glands, and an increase in the eosinophil elements of the anterior pituitary body. Similar observations have been made on infants born to mothers who were not

diabetic at the time of delivery but in later months or years developed signs and symptoms of diabetes. Since all the mothers who have been studied thus far became diabetic during the childbearing period, that is, under 40 years of age, it was considered desirable to extend the observations to infants born to mothers whose diabetes appeared after they had passed the fourth decade.

The fetal and neonatal mortality rates and the average birth weight are increased among infants born to mothers who subsequently manifest diabetes mellitus, even though the latter do not develop the disease until after forty years of age. The fetal and neonatal mortality rates increase as the onset of maternal diabetes is approached. Maternal obesity is not a factor in the increased average birth weight of infants born to prediabetic mothers who become diabetic after the age of 40. CHARLES BARON, M.D.

Comfort, A.: Congenital Syphilis in an Infant Treated with Penicillin. *Lancet*, Lond., 1945, 249: 432.

A syphilitic mother was given 8 injections each of mapharside 0.04 gm. and bismuth 0.2 gm., and a month later gave birth to a child weighing 6 lb. 2 oz. at birth. At one month of age the female infant was found to have strongly positive Wassermann and Kahn reactions, and two weeks later developed a rash, nasal discharge, and dyspnea. Her weight at this time was 7 lb. 14 oz., her frontal bosses were prominent, her scalp was covered with thick black hair, and the upper ends of the tibias were tender and enlarged. The body was covered with a scaly polymorphic maculopapular rash, and there was a copious mucopurulent bloodstained nasal discharge. The respiratory rate was 36, and moist sounds were heard in all areas of the chest. The temperature now rose to 106.5°F., and the respiratory rate to 70; an area of impaired resonance with tubular breathing developed on the right side, and extended up the spine.

The child was started on sulfapyridine (1.75 gm.) in 4-hour doses, but on the second day intramuscular injections of 38,000 units of penicillin were started and stopped after 412,000 units had been given. Thereupon the temperature rose to 108°F., but it fell soon afterward to 102°F. The general condition of the patient remained about the same, the pertinent blood findings at this time being polymorphs 30 per cent and lymphocytes 50.5 per cent. Four-hour injections of penicillin, 9,500 units, were started again and in 24 hours the temperature had fallen to normal, the nasal discharge had ceased, and the pulmonary signs had begun to clear. However, an additional 95,000 units were given before the drug was stopped. Immediately the temperature rose again and there was a slight return of the nasal discharge. The epiphyses were larger and very tender. Inunctions of ung. hydrarg. nit. fort. to the abdominal wall was begun and 4 injections of 0.5 c.cm. of acetylarsan were given every third day. After this the respiratory rate was still high but pulmonary signs were almost absent. The temperature range was lower, from 100 to 102°F.

Immediately the 4-hour injections of penicillin in 9,500 units were resumed. Once more the fall in temperature to normal was immediate, and after a further 95,000 units were given it remained down.

Finally, 4 days later 100,000 units of penicillin were given over a period of 3 days, whereafter all medication was stopped, and a week later the Wassermann and Kahn reactions were negative and the epiphysitis had subsided. Thus, before the reversal of the Wassermann reaction there were administered 702,000 units of penicillin, and 2 c.c. of acetylarsan, also some mercury and potassium iodide. Since then the child has remained practically well, and the Wassermann reaction has remained negative. A convergent squint persists, but vision appears to be present, and there is no choroiditis.

From this experience the author concludes that in these acute cases of congenital syphilis the combined therapy as given in detail should remain the method of choice. JOHN W. BRENNAN, M.D.

MISCELLANEOUS

Miller, N. F.: Tubal Patency Tests. *J. Am. M. Ass.*, 1945, 129: 243.

Uterotubal insufflation and uterosalpingography are widely accepted and well established procedures for the determination of tubal patency or its absence, and the latter is discussed with regard to sterility in the female. This survey of hundreds of tubal insufflations and 400 cases of uterosalpingography over a 24 year period shows the value of these procedures and has led to significant conclusions.

Genital infection, either salpingitis or cervicitis, is the chief contraindication to the performance of either of the mentioned tubal patency tests; likewise, pregnancy, constitutional disease, and pelvic neoplasms also contraindicate these tests. Thorough knowledge of the menstrual history and a pelvic examination immediately prior to the test are essential. The week following menstruation is the most satisfactory time for the performance of either test.

The use of gas insufflation and the intrauterine introduction of radiopaque substances are supplementary tests, both necessary for a complete evaluation of tubal patency; the former procedure is used initially and the latter is generally reserved for those cases in which patency is not found following insufflation. In the simple procedure of introducing air or carbon dioxide (preferred) into the uterine cavity, pressure observations are essential; a rise in pressure (under a constant slow flow of no more than 300 c.c.) to 120 mm. and a falling off to from 40 to 60 mm. is encountered with normally patent tubes. A progressive and persistent rise in pressure is reasonable evidence of nonpatency. Kymographic recordings of manometric data are important. In substantiating patency in both tubes or localizing it

in one, the symptoms, first of lower quadrant pain and then of shoulder pain should be correlated with manometric readings and with auscultation over the right and left lower quadrants to ascertain if air is escaping from the tubes. The importance of repeated testing on successive occasions is stressed.

Roentgen visualization of the tubes is essential when stenosis or complete tubal closure is revealed by insufflation, and permits more accurate localization of the obstruction, particularly when salpingostomy is contemplated. From 6 to 10 c.c. of a warm opaque medium such as lipiodol are used, and observations are made under fluoroscopy of the escape of the oil from the ostia or its retention in the tubes. Immediate, 24 hour, and 48 hour roentgenograms are essential in each instance as a permanent record, and often disclose the late escape of oil or the presence of oil in the peritoneal cavity to refute an earlier impression of non-patency. The therapeutic effect of oil in opening closed tubes has been observed, especially when the procedure is repeated. Although an ideal oil, which is nonirritating and affords a good visual contrast on the x-ray plate at the same time, has not been found, the incidence of morbidity attendant on this procedure appears to be slight. On the basis of available data, insufflation results in morbidity in less than 1 per 1,000 cases; gas embolism is the chief pathological cause in the rare case. The percentage of morbidity following the use of oil is slightly higher, oil embolism having been reported in some cases during the earlier years of the development of the tests.

Both tests when used in conjunction with one another and when properly performed are safe and highly informative for the diagnosis of tubal patency.

PHILIP B. CHASE, M.D.

Rinehart, R. E.: Serum Protein in Normal and Toxemic Pregnancy. *Am. J. Obst.*, 1945, 50: 48.

Two hundred and fifty-one determinations of the serum protein of 79 normal pregnant women and 39 on 5 pre-eclamptic women were made.

The average value for serum globulin remains almost constant throughout normal and toxemic pregnancies. During the normal pregnancy the average value for the total protein tends to fall from the nonpregnant level to a minimum during the eighth and ninth month and to rise rapidly to normal after delivery. At its lowest point this represents a decrease of 7.1 per cent from the nonpregnant average. This decrease in the concentration of total protein is confined primarily to the albumin fraction. The albumin decreased from a nonpregnant average value of 4.9 to 4.0 gm. per 100 c.c., a fall of 14 per cent. The average value for total protein in preeclampsia was 14 per cent below that of normal women in the same stage of pregnancy. This decrease in total protein is confined to the albumin fraction. It was 12 per cent lower than the lowest average value obtained at any time during normal pregnancy, and 33 per cent lower than the average for normal nonpregnant women.

The probable dependency of these changes on known alterations of the function of the liver during pregnancy has been considered. A total of 15 determinations of the serum protein in simultaneously drawn maternal blood and blood of the cord was made. The albumin content of maternal serum and serum of the cord is nearly identical; a slight difference is noted in the globulin fraction.

Vaux, N. W., and Rakoff, A. E.: Estrogen-Progesterone; A New Approach in the Treatment of Habitual Abortion. *Am. J. Obst.*, 1945, 50: 353.

A study was made of a group of 24 patients with habitual abortion who were treated with estrogen and progesterone. These patients had gone through a total of 80 previous pregnancies from which there had resulted only 7 living babies (9%). There had been 52 abortions, 18 miscarriages, 2 stillbirths, and 1 premature live birth in which the infant did not survive. Fifty-four per cent of the patients had no difficulty in becoming pregnant, 8 per cent were of diminished fertility, and 38 per cent were of poor fertility. In none of these patients were there any pelvic abnormalities or systemic diseases which would influence abortion. In only 1 patient was the basal metabolic rate diminished. Two patients had Rh incompatibilities (Rh-negative wife and Rh-positive husband). One of these delivered a normal living baby and the others aborted; in neither case did Rh antibodies develop.

Information about the endometrium obtained by biopsy or curettage was available in 11 cases before the present pregnancy. Good secretory function was noted in 7 cases, impaired secretory function in 2, and an interval endometrium in 2.

Urine hormone assays were made in 15 cases prior to the onset of pregnancy. Urine gonadotropin assays made at the midcycle were normal in 87 per cent. Urine estrogen assays made at the midcycle and during the third week of the cycle were diminished in 67 per cent, while low or absent pregnandiol values were obtained in 53 per cent. Since these studies were made in only one cycle, their significance is limited.

Hormone assays consisting of determinations of the urine pregnandiol, serum estrogens, and serum gonadotropins were made early in pregnancy in 10 cases. In almost all of the cases one or more additional assays were made and in 3 cases monthly assays were done.

On the initial assay 95 per cent of the cases showed normal serum gonadotropins. Seventy-nine per cent had diminished serum estrogens, and 83 per cent had diminished pregnandiol titers. In 13 of the 19 cases studied, both the estrogens and pregnandiol were diminished. These findings indicate a deficiency of the corpus luteum during the early weeks of gestation and an inadequacy of the placenta to take over its functions.

Many of the patients had been unsuccessfully treated in previous pregnancies with progesterone, thyroid, and vitamin E.

During the present pregnancy all patients were treated by the injection of progesterone (10 mgm.) and alpha-estradiol benzoate (10,000 rat units), given together two or three times weekly. This treatment was generally continued to the period of viability or later.

There was fetal salvage of 16 babies, or 67 per cent. There were 15 full term live births (with 1 neonatal death due to congenital abnormalities), 3 premature live infants (2 survived), 2 miscarriages, and 4 abortions. EDWARD L. CORNELL, M.D.

Nicodemus, R. E., Ritmiller, L. F., and Ledden, L. J.: Continuous Caudal Analgesia in Obstetrics on Trial. *Am. J. Obst.*, 1945, 50: 312.

Of 500 deliveries with caudal analgesia, 469 of the patients had complete relief of pain and 16 had partial relief; 15 patients were unrelieved. The authors state that caudal analgesia has given a higher percentage of complete relief to the mother than any other method, or any combination of methods, that they have employed. They believe that no other anesthetic is required and that it is not necessary to call an anesthetist to control the patient for the final delivery and repair.

In the authors' experience, the patients were nearly always ready to eat a little food and drink fluids immediately after delivery; in fact, many of them were able to do so during the course of their labor, all of which aided greatly in the maintenance of normal blood chemistry and, consequently, fluid and nutritional balance.

The analysis shows that in patients in whom caudal analgesia was used the labors were longer, uterine contractions were of less intensity, and the expulsive force of the abdominal musculature was lost. Spontaneous rotation occurred less often in occipitoposterior positions, and operative deliveries were increased. Breech deliveries were easier and safer. There was a lower incidence of stillbirths, a lower maternal morbidity, diminished blood loss with delivery, less permanent damage to the birth canal, and the patients were pleasant, happy, and co-operative. EDWARD L. CORNELL, M.D.

Hanley, B. J., and Malone, C. M.: Caudal Analgesia in Obstetrics with Special Reference to Repeated Single Blocks. *Am. J. Obst.*, 1945, 50: 306.

The authors present the results obtained in a series of 1,925 patients with caudal block. A technique for complete analgesia and delivery under repeated single caudal injections with ¼ per cent tetracaine is described.

Single caudal-block technique has a definite place in the practice of obstetrics. Its use is varied. It can be used as a single block for delivery, or it can be repeated throughout labor for analgesia and delivery. The results with caudal anesthesia for obstetric surgery are very encouraging. Single caudal block, when administered by an experienced individual under proper conditions, can be as safe as other forms of analgesia, or more so.

Caudal block administered correctly will give as good results as any other form of analgesia. The use of interrupted single caudal blocks for analgesia and delivery gives promise of effectiveness and safety for mother and child. Caudal anesthesia in obstetrics should be limited to well equipped institutions, which have a full-time resident or a teaching staff.

EDWARD L. CORNELL, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Maegraith, B. G., Havard, R. E., and Parsons, D. S.: Renal Syndrome of Wide Distribution Induced Possibly by Renal Anoxia. *Lancet*, Lond., 1945, 249: 293.

The authors discuss the nature and distribution of a type of renal failure seen in a great variety of acute illnesses. The syndrome is a condition of impaired renal function developing usually in an acute illness, and often associated with a transient peripheral circulatory failure. The onset of oliguria or anuria is commonly the first sign. In patients who survive there is also a postanuric period of impaired renal function, with nitrogen retention and often a copious unconcentrated urine. The postanuric period may last for several weeks, but eventually there is complete and permanent recovery. The reversible nature of the renal failure is the chief feature that distinguishes this syndrome from the other forms of nephritis.

In patients who die the kidneys have a characteristic appearance postmortem. They are usually enlarged, with a swollen, pale cortex and often an engorged medulla; the epithelium of the convoluted tubules is degenerated, necrosed, or desquamated. The damage may be concentrated chiefly in the ascending loop of Henle and in the distal convoluted tubules. The lumina of the tubules are usually filled with debris, and with desquamated cells, either intact or fragments. The debris is often stained deeply by the pigments which may be present in the urine at the time the lesions develop. It is a constant observation that the glomeruli and their capsules appear nearly, if not quite, normal. The vessels of the medulla, on the other hand, are usually engorged, and often there are apparent hemorrhages into the lumina of the tubules.

The main features have been noted in widely differing conditions. In blackwater fever, incompatible blood transfusion, and in icterus neonatorum there is extensive intravascular hemolysis, but in recent years the syndrome has been frequently observed in crush syndrome, in which hemolysis is lacking. In the above mentioned conditions the syndrome is always associated with the presence of pigment in the urine, and it has been thought that the pigment, if not the immediate cause of the anuria, is the cause of the damage to the renal tubules. However, experiments designed to establish this have been inconclusive. The syndrome develops in many conditions in which abnormal pigment is absent from the urine. In the alkalosis of gastric tetany that may arise during the treatment of peptic ulcers, similar nitrogen retention occurs, accompanied by similar characteristic changes in the kidney. There are also many other conditions in which the features of this syndrome have been reported. The anuria, the impairment of renal function, and the characteristic microscopic appearance of the kidney have been described in cases of septic abortion, cholera, yellow fever, Weil's disease, diabetes, hepatorenal syndrome, pernicious anemia, and carbon monoxide poisoning.

Three different causes have been suggested: (1) mechanical blockage (this does not account for the many similar cases of anuria in which pigment is absent, and it has now been generally abandoned); (2) a "nephrotoxic" effect of some injurious substance carried to the kidney by the blood-stream; (3) renal anoxia, the main cause of renal damage being the temporary deprivation of oxygen.

The nephrotoxic theory demands that a wide variety of toxins, many of them hypothetical or at least unidentified, shall all produce syndromes which are very similar in their clinical and pathological appearances. The situation is not unlike that existing in the study of rickets before the discovery of vitamins.

The authors express the opinion that the evidence at present available favors the hypothesis that renal anoxia plays a large part in producing this syndrome, in that it results in damage to the renal epithelium, and consequent impairment of renal concentrating power. The oliguria and anuria that occur in many instances are probably the direct result of the disturbances of renal blood-flow that follow peripheral circulatory failure. If this is correct, it has an important practical application, for the prevention of anuria in these conditions will then depend more upon the support given to the circulation than upon efforts to keep the urine alkaline. Blood transfusion is the most effective means of providing the depleted blood stream with fresh oxygen-carrying power in conditions in which "shock" is accompanied by anemia, as in traumatic hemorrhage and in blackwater fever. To be effective, however, it must be given early.

The authors suggest that "renal anoxia" is a suitable name for the syndrome.

JOSEPH K. NARAT, M.D.

Goyanna, R., and Greene, L. F.: Pathological and Anomalous Conditions Associated with Duplication of the Renal Pelvis and Ureter. *J. Urol.*, Balt., 1945, 54: 1.

Complete duplication of the renal pelvis associated with complete or incomplete duplication of the ureter is a common anomaly which in itself has no clinical significance. At the Mayo Clinic it was found 25 times in 2,000 consecutive autopsies, an incidence of 1.25 per cent. It is sometimes contended that duplication makes the upper part of the urinary tract more liable to pathological conditions. If such is the case, and in view of its relative frequency, duplication may assume clinical importance.

If some associated pathological or anomalous condition is present, one of the segments may be nonfunctioning and therefore roentgenographically invisible, which would create diagnostic difficulties. In a 10 year period, 131 patients at the Mayo Clinic presented 154 pathological or anomalous conditions associated with complete duplication of the pelvis and complete or incomplete duplication of the ureters. The so-called bifid pelvis, although theoretically a type of duplication, was not included, for its frequency is so great that it may be considered more as a normal variation than as a true anomaly.

The most common pathological condition found associated with duplication was hydronephrosis or hydroureter, or both. This was twice as common on the right as on the left side and nearly twice as common in the lower as in the upper segment.

The fact that the incidence of pyelonephritis, pyonephrosis, and atrophic pyelonephritis also is higher in the lower segment than in the upper one may be considered a consequence of the faulty drainage of the hydronephrosis. In all cases of ectopic ureter and in all cases of ureterocele associated with duplication, the ureter from the upper pelvis was the one affected.

The diagnosis of duplication is usually made without difficulty by means of an excretory urogram. However, if one of the segments is nonfunctioning, the excretory urogram may appear normal. The following roentgenographic signs are suggestive of duplication: (a) elongated renal shadow, (b) the presence of a region of kidney with no means of drainage, or (c) the shape of the visualized pelvis.

Excretory urography alone cannot be depended upon to distinguish between complete and incomplete duplication of the ureters, unless the entrance of both ureters into the bladder is clearly seen. Cystoscopy and retrograde pyelography, although helpful, may fail when the supernumerary orifice is hidden or when there is incomplete duplication.

A history of congenital incontinence associated with normal micturition is strongly suggestive of duplication with an ectopic ureter.

JOSEPH K. NARAT, M.D.

Shearer, T. P., Wiper, T. B., and Miller, J. M.: Renal Carbuncle; a New Method of Treatment. *J. Urol.*, Balt., 1945, 54: 12.

The majority of renal carbuncles reported in the literature have been treated by nephrectomy. In many instances, the lesion is of such size that considerable functioning renal tissue is sacrificed. However, to date, mortality statistics favor the more drastic procedure of nephrectomy instead of incision and drainage alone, or incision and drainage combined with nephrectomy at a later period. These mortality figures hold although nephrectomy is often extremely difficult, even when a small inflammatory lesion is present. The perinephric tissues in these instances are frozen and the kidney is closely adherent to the surrounding structures, which makes its removal very difficult.

An almost universal observation is that the renal carbuncle is preceded by a cutaneous infection such as a paronychia, boil, or a carbuncle. The time intervening between the cutaneous infection and the onset of symptoms due to renal disease varied from a few days to many months.

The symptoms are usually nonspecific in nature and do not point directly to the urinary tract as the seat of the difficulty. Malaise, at times progressing to prostration, chills, and fever, is present. Urinary symptoms are lacking. It is not surprising, therefore, that the average length of time between the onset of illness and the institution of surgical treatment has been 66 days.

The authors have had occasion to treat an individual with a renal carbuncle successfully by incision and drainage, combined with the administration of penicillin via the systemic and local routes. The patient was a 20-year-old white male whose presenting symptom for 2 months was pain of moderate severity in the left lower chest and upper abdomen. The pain was associated with temperature of a septic type which at times was as high as 103 degrees. Upon inquiry the patient stated that 4 days before the onset of pain he had had several boils on his face and 2 carbuncles in the right cervical region.

Laboratory examinations gave no information. The patient presented a few moderately enlarged lymph nodes in the inguinal regions and the intercostal spaces. Special studies of blood smears did not reveal evidence of a blood dyscrasia.

A review of the excretory urograms made before submission of the patient to treatment demonstrated the calycine compression mentioned before. Retrograde pyelograms revealed that the middle and lower calyces of the left kidney were smaller than normal and were pushed medially. There was no alteration of the psoas muscle shadows in these roentgenograms.

The preoperative diagnosis was "renal carbuncle." As penicillin was available for postoperative therapy, incision and drainage was deemed the procedure of choice.

The usual lumbar incision for exposure of the left kidney was employed. This incision was satisfactory, but exposure was technically difficult because of the great number of adhesions which bound the kidney to the surrounding structures. Some increase in exposure was obtained by subperiosteal resection of a segment of the twelfth rib. The kidney was freed to the hilar structures anteriorly and posteriorly and carefully palpated. An aspirating needle was passed into several suggestive areas and purulent material was finally obtained from a site deep in the substance of the kidney at the junction of the upper two-thirds and the lower one-third. Subsequent needle punctures delineated the cavity, which was entered with a ureteral scalpel. Ten cubic centimeters of thick purulent material were released and a No. 16 F. catheter was sutured into the cavity. Bacteriological examination of this material estab-

lished the presence of a hemolytic staphylococcus aureus in pure culture. One Penrose drain was placed at the upper pole of the kidney and a second one at the lower pole. The wound was closed in layers.

Penicillin treatment was instituted and 200,000 units of the drug were administered intramuscularly every day. In addition, the abscess cavity was lavaged twice daily with 5 c.c. of a solution of penicillin containing 250 units per cubic centimeter. The response to treatment was gratifying. A scanty serous discharge persisted for about 3 days. The operative wound healed nicely and the temperature gradually became normal. Improvement in the general condition was rapidly apparent. Retrograde pyelography 25 days after operation revealed complete restoration of the calycine structures to normal.

JOHN A. LOEF, M.D.

Tahara, C., and Hess, E.: Massive Renal Fibrolipoma. *J. Urol.*, Balt., 1945, 54: 107.

Two enormous fatty tumors of the kidney are herewith reported. It is interesting to note that these tumors had existed for a considerable period of time; that they caused, apparently, hypertension and loss of weight; and that they were both associated with a unilateral chronic pyelonephritis. In both of these cases, nephrectomy has reduced the blood pressure to somewhere within normal limits. Both patients were markedly improved by the surgery, and both cases must be considered as benign, from the pathological reports, but with definite malignant characteristics.

JOHN A. LOEF, M.D.

Goldstein, A. E., and Klotz, B.: Ligation of a Supernumerary Ureter. A Clinical and Experimental Study. *Am. J. Surg.*, 1945, 70: 13.

Intentional ligation of a ureter without performing a nephrectomy is rarely ever done except in experimental work. Intentional ligation of a supernumerary ureter without performing a heminephrectomy is the subject of discussion in this article.

The clinical application of ligation of a supernumerary ureter was used by the authors in 4 instances on 3 private patients, 1 patient having the operation performed bilaterally because of pain in bilateral supernumerary fused kidneys. The operation in all of the cases was performed because of pain either in the lumbar or abdominal region. In 3 cases the discomfort or pain was on the left side, whereas in 1 case it was bilateral. The pain had been present between 6 months and 7 years. It was intermittent at first but later became constant in all of the cases, and, although not sharp, was very acute in 2 cases, simulating either a kidney colic or Dietl's crisis. Activity seemed to increase the pain. None of the patients showed any evidence of infection either by the presence of pus or organisms. All were females under 40 years of age, 1 having borne children, whereas 2 had not. Two of the 3 were married.

Functional studies revealed a good output in the opposite kidney, as well as a good excretion in the lower normal segment. The function of the supernumerary or upper segment was found to be fair. The capacities of the pelves of the upper segments were less than those of the lower ones, ranging between 3 and 5 c.c.

The pyelographic studies were made both by the intravenous and the retrograde method, and it was observed in all of the cases that the pelves and the calyces of the upper segments were smaller than the pelves and calyces of the lower ones. A reproduction of the pain was obtained in all the cases by injecting the supernumeraty segment with water.

Numerous dilatations, first of the supernumerary ureter and then of the other ureter on the same side, were performed in all of the cases. The number of dilatations of the supernumerary ureter varied from 3 to 12. In 1 case the supernumerary ureter presented a real stricture at the orifice. In the other cases a No. 6 catheter met a slight obstruction which was easily overcome. None of the cases showed a dilatation of the supernumerary ureter.

The emptying time seemed to be normal, from 4 to 8 minutes, in all of the supernumerary segments.

Previous to the operation a catheter was placed in the supernumerary ureter. The ureter was exposed extraperitoneally through a Gibson incision. The midthird of the ureter was selected for the ligation. After the ureter had been freed for a short distance, 3 chromic catgut ties were placed around it, about ½ cm. apart. The ureter was cut so that 2 of the ties were left on the lower portion and 1 was left on the upper portion; a small portion was removed for examination. The upper portion of the ureter was observed for a few moments but no great perceptible dilatation occurred. No leakage of urine resulted from the operation so that the wound was closed without drainage.

All of the wounds closed by first intention. Peculiarly enough, while the patients had some pain after operation, which was the result of the operation, they all claimed it was of a different type. In all, the original type and location of pain seemed to have disappeared immediately after the operation.

Pyelograms of the remaining kidneys were made by the intravenous route. When the pyelograms were made it was observed in all cases that the dye did not come through the supernumerary segment but through the other 2 kidneys, in normal time, and that the appearance of the remaining pelves was the same as in the original retrograde pyelograms.

The patients were discharged in from 12 to 21 days.

In this study it was observed that after a ureter is ligated and cut a hydronephrosis immediately starts. Although this never assumes a very large size, it is present. From a functional standpoint, the urine ceases to secrete very shortly after ligation, which fact was also borne out by the experimental work, so that when an intravenous pyelogram was made, no dye was found in the kidney pelvis or calyces.

The pain appeared to subside almost immediately after the ligation, although there was some ache in

the lumbar region for about 3 months in 2 of the cases, which was described as a different type of pain. This was probably a postoperative ache that might be encountered following any operation.

These cases have been followed from 6 to 7 years.

JOHN A. LOEF, M.D.

BLADDER, URETHRA, AND PENIS

Ockuly, E. A.: Bilharziasis of the Bladder (Vesical Schistosomiasis). *J. Urol.*, Balt., 1945, 54: 39.

The organisms producing bilharziasis of the bladder are the blood flukes, schistosoma hematobia, discovered by Bilharz in 1851. They are small, white worms belonging to the phylum platyhelminthes, and are sexually differentiated trematodes. Their home is, primarily, in the vesical venous plexus of man. Here the male, a short, somewhat flat worm measuring from 10 to 15 mm. in length and about 1 mm. in breadth, mates with the female, which is more threadlike, and measures about 20 mm. in length and ¼ mm. in breadth. Each is equipped with two suckers, one at the proximal end and another on the ventral surface slightly caudal to the first. These suckers permit them to adhere to the venous walls, which avoids their haphazard dissemination by the flow of blood. The fertilized ova are deposited singly in file by the female along the courses of small submucous veins of the bladder. The eggs are deposited one directly behind another until no more space remains. This is then repeated from venule to venule, which not infrequently severely obstructs them. It is estimated that a pair of schistosoma hematobia may live as long as from 20 to 30 years, continuing this process throughout their lifetime. Eventually, the eggs erode the wall of the venule and drop into the bladder cavity. Being free within the cavity of the bladder, they are readily voided with the urine. To permit survival, the ova must come in contact with fresh warm water immediately after voiding. From the ova, a miracidium larva emerges which, after a free life of about 6 hours, enters a fresh water snail and seeks out the snail's liver where it passes through a sporocyst stage, multiplying many times in number through a budding process, and then emerges from the snail as forked-tailed larvae or cercariae. As cercariae, they swim about freely in the water and must find a human host within 48 hours in order to survive. With suckers, they attach themselves to the human skin, shake off their tails and burrow through. Entering the blood vessels, they eventually find their way to the liver where they grow to adult male and female. After attaining maturity, they migrate to the vesical venous plexus where they mate and egg laying occurs, thereby completing the cycle.

The symptoms of bilharziasis of the bladder may be divided into four stages:

In the first stage, symptoms of skin irritation occur at the site of entry of the larva. These may be slight to severe pruritus and may completely escape the patient's attention.

During the second stage, generalized toxic symptoms may occur. The time interval is from 4 to 12 weeks after exposure. Again, these may be so slight as to not require medical aid. However, headache, backache, and chills and fever with night sweats are the symptoms of which the author's patient complained upon his first hospitalization, and they correspond to the migration of the parasites and the first egg laying by the females. At this time, the blood shows a leucocytosis and high eosinophil count. Not infrequently, the abdomen is tender and the liver and spleen are palpable.

In the third stage, symptoms of bladder irritation become prominent. There is urinary frequency, dysuria, and hematuria. Ova are now found in the urine. This stage corresponds to the bladder condition observed by the author in his case at the cystoscopic examination: a confluent papillarylike growth was found to cover the entire trigone. The areas surrounding the ureteral orifices were especially involved. Beyond the trigone on the posterior wall of the bladder, three isolated areas typical of the trigonal involvement were present. This finding in the bladder could hardly be confused with a true papilloma because it was lacking in the fine villi, and presented a deeper red to slight purplish color. The appearance was neither that of a papilloma nor of a bullous edema, rather something midway between. Interspersed in the area involved were several discrete yellow to gray nodular masses.

The fourth stage corresponds to the symptoms and pathological changes encountered in its many and varied forms from the time of the passing of the ova in the urine to the death of the patient unless treatment is instituted. During this stage, the bladder findings are typical of the changes encountered in long standing chronic bladder irritation. There is proliferation of the mucous membrane with subsequent necrosis, ulceration, and secondary infection. Secondary stones are common and phosphatic deposits frequently cover large areas of the inflamed bladder wall. Subsequent fibrosis and scar tissue occur. The bladder capacity is diminished, at times to the point of complete incontinence. With bladder fibrosis and contracture in which the lower ureters take part, ureteral obstruction progresses. Hydronephrosis, renal infection, uremia, and sepsis follow. The secondary pyogenic infection may extend through the bladder wall and urethra, producing perivesical and perineal abscesses with suprapubic, perineal, and rectal fistulas. Elephantiasis of the genitalia due to interference with lymphatic drainage has been reported. A true papilloma with eventual malignant changes may occur, produce the characteristic findings and symptoms, and lead to eventual death from papillary carcinoma of the bladder. In severe infestations, the prostate and seminal vesicles are also frequently involved, which results in infections, abscesses, and fibrosis of these organs. Ova have been found in the semen of these cases. In women the disease is less frequent, but vaginitis, cervicitis, ulcers, papillomas of the vulva,

and carcinoma of the bladder have also been reported.

Fairley's complement fixation test is said to give a group positive reaction during the latter part of the incubation period. At the present time, the diagnosis of bilharziasis of the bladder must await the symptoms and findings of bladder disease. Ova containing the characteristic terminal spine in the voided urine, the cystoscopic picture, and biopsy of the affected bladder wall clinch the diagnosis.

The author's patient was treated with fuadin, a trivalent sodium antimony compound. It is administered intramuscularly in the dosage of 5.0 c.c. on alternate days after the first two injections of 1.5 and 3.0 c.c. given on successive days. A total of 40.0 c.c. is given over a period of 16 days.

The necessity of early diagnosis as well as early, proper, and adequate therapy is absolutely essential if a complete cure is to be attained. Prevention of human infestation is, of course, the first and most important problem. In countries such as Egypt, swamps and lakes have been drained, the courses of streams changed, vegetation laboriously removed from lakes and streams to starve the snail, the intermediate host, and wholesale poisoning of the snails has been done, but without any noteworthy success. The fundamental approach lies in the education of the natives and in winning their cooperation in presenting themselves early for treatment.

JOSEPH K. NARAT, M.D.

Oppenheimer, G. D.: Late Invasion of the Bladder and Prostate by Carcinoma of the Rectum or Sigmoid. *J. Urol.*, Balt., 1945, 54: 162.

Fifteen cases of late invasion of the bladder and/or prostate and seminal vesicles following abdominoperineal resection for cancer of the rectum or for obstruction due to sigmoid cancer are reported. Direct involvement of the lower urinary tract by cancer of the lower bowel occurs frequently; in 50 autopsies of patients with cancer of the rectum, 20 per cent of whom had a rectal resection, the bladder was found to be invaded 21 times. Bladder, prostate, and seminal vesicle involvement in the male, and bladder and uterine involvement in the female, apparently takes place by direct extension. Twenty-two of the 50 cases (44%) showed compression of one or both ureters. Metastases to the ureters or kidneys were uncommon. At least 10 per cent of the patients who survive abdominoperineal resection have late involvement of the bladder, prostate, or seminal vesicles.

Palliative urological or surgical measures and radiotherapy should often be attempted even after lower urinary tract involvement, because life may be prolonged; this was shown by 2 reported cases. In one, an obstructive sigmoidal resection was performed for infiltrating adenocarcinoma after preliminary cecostomy; 4 years later, cystoscopy was performed for hematuria, and a 1½ cm. posterosuperior bladder tumor was fulgurated; two years later, another tumor, reported as adenocarcinoma, was refulgurated. The second patient had a transurethral resection of recurrent adenocarcinoma involving the bladder neck and prostate, 7 years after abdominoperineal resection and radiotherapy. Histologically, the transurethrally resected tissue was definitely secondary to direct extension from the residual rectal growth.

The results obtained justify attempts to undertake radical surgery even though the local lesion is fixed to the surrounding structures, and also justify later palliative urological therapeutic efforts.

DAVID ROSENBLOOM, M.D.

GENITAL ORGANS

Greene, L. F., and Thompson, G. J.: Transurethral Prostatic Resection in Patients with Advanced Renal Insufficiency. *J. Urol.*, Balt., 1945, 54: 166.

Transurethral prostatic resection can be performed safely in the presence of advanced renal insufficiency; and suprapubic cystostomy preliminary to prostatectomy is no longer considered necessary. By means of transurethral prostatic resection, free urinary drainage through the natural urethral channel can be quickly and safely restored.

Fifty-four case reports are presented, in which transurethral prostatic resection performed in the presence of severe renal insufficiency is described. The blood urea was well above 100 mgm. per 100 c.c. in every case, and resection was performed when the blood urea, although reduced, still remained 100 mgm. or more; in the large majority of patients the urea was higher than 150 mgm. per 100 c.c. of blood, and in almost half it was more than 200 mgm. per 100 c.c. The youngest patient was 49, and the oldest 79. Fourteen patients had severe hypertension, and 10 had cardiac disease. Profound acidosis was present in every case. In practically every case the urine specific gravity was fixed and less than 1.015.

Preoperative treatment consisted of urethral catheter drainage, the intravenous administration of fluids so that the daily urinary output was between 2,000 and 3,000 c.c., the intravenous administration of sodium lactate or bicarbonate for acidosis, and blood transfusions for anemia. Treatment was continued until the blood urea and the carbon dioxide combining power were stabilized, which was the optimal time for operation. In more than two-thirds of the cases the necessary preoperative preparation was completed within two weeks.

Prostatic resection was usually performed under spinal anesthesia, and, occasionally, under pentothal sodium. In more than half of the cases it was unnecessary to remove more than 29 gm. of prostatic tissue in order to relieve the obstruction completely. Frequently, the prostate glands were small when they were most obstructive, and this has led to failure in the diagnosis in a number of cases in which the patients' complaints were of nausea, vomiting, and anorexia. Particular care should be taken to remove all of the obstructing tissue.

Of the 54 patients, 1 died of coronary occlusion 2 days postoperatively. More than half of the patients were able to leave the hospital within 2 weeks. The instillation of 1:750 solution of gentian violet into the bladder was the most effective method of stimulating the return of vesical tone. In some patients, when the blood urea had remained stabilized preoperatively in spite of further drainage and intravenous fluids, resection resulted in a fall of the urea concentration of the blood.

Follow-up on 45 patients showed that 29 were alive and 16 were dead at the time of the report; 9 died in less than 1 year, 2 in 2 years, 2 in 3 years, and the remainder in from 5 to 8 years. Of the patients alive at present, more than half have lived three or more years since resection. Although many patients had gastrointestinal symptoms prior to resection, none of them has had a recurrence.

Transurethral prostatic resection can be performed on patients with advanced renal insufficiency with minimal risk, and the surgeon should not hesitate to perform resection in cases of this type. It has resulted in great economic advantage to these patients. Thus, transurethral resection has provided surgical relief of patients suffering from prostatic obstruction and renal insufficiency.

DAVID ROSENBLOOM, M.D.

Hey, W. H.: Asepsis in Prostatectomy. *Brit. J. Surg.*, 1945, 33: 41.

In an effort to devise a technique of prostatectomy with an asepsis emulating that of other surgical procedures, the author has experimented with operative possibilities in the cases of more than 600 patients during a period of about 6 years. The present study, however, is based on only the last 300 patients of the series, after the experimental period had passed and the methods had become more or less fixed. In this technique, the author repudiates all use of the catheter or, indeed, of anything passed through the urethra. If it is necessary to relieve distress in acute retention, he believes that the bladder should be punctured suprapubically with a spinal puncture needle. All manipulations are carried out suprapubically; the bladder is decompressed at once and the full prostatectomy is carried out in the normal way. After the prostate has been enucleated, meticulous hemostasis is provided by means of a hemostat to which is attached the diathermy cable, deep bleeding being rendered accessible by the commonly advocated removal of the V-shaped, or semicircular, portion of the trigone by means of a "live" needle held in the jaws of the hemostat. Any blood clots are removed by suction and not with a swab. A couple of ounces of 5 per cent sodium citrate solution will prevent further clots in the prostatic bed and bladder.

A rubber tube is then passed from the bladder through the urethra in a retrograde fashion, with the attached remnant of the prostatic urethra as a guide. To pass this tube, the distal end is tied to a black French bougie with its bulbous proximal end cut off. The rubber tubing and bougie are well covered with acriflavine-vaseline, which it is hoped will act as a pack around the tube within the urethra.

The bladder should be securely and completely closed, after which it is suctioned to evacuate citrate, air, and any blood clot, the last being rare. From 2 to 10 oz. of sodium citrate solution are left in the bladder and a spigot is inserted. This spigot is removed about two hours after the operation and the tube is connected with further sterile tubing and let into a sterile Winchester bottle of sterile water.

It takes from one day to one week for the urine to become clear, but if the clearance is delayed for more than 3 days infection must be suspected. Hematuria not requiring interference occurred in this series of cases; in the author's opinion this indicates cystitis.

The operation is done under low spinal anesthesia and the patient is out of bed every day after the operation, if only for a few minutes. Chemotherapy, which consists of not more than a half gram of sulfamethazine or sulfathiazole every 6 hours, is stopped on the fourth day but is renewed with the greatest intensity at the slightest sign of sepsis.

With this method (roughly outlined here for the purposes of this abstract), the author procured results which are characterized as startling; the more so as during the period of this series of operations only 335 cases of definite prostatic obstruction were seen. The surgeon refused to operate in only 6 instances; in 5 patients death seemed imminent, and in the other patient the condition was sarcomatous. Twenty-nine of the 335 patients refused operation or went elsewhere, and 300 were operated upon.

For the purpose of analyzing the mortality the material is divided into four groups:

Group 1 consisted of patients in whom there was no marked systemic disease. In this group the residual urine at operation was 6 oz. or under; indigo-carmine was passed through the urethra in less than 10 minutes, and the urine was normal, usually acid, and the blood-urea 50 or under. This group included 189 patients with 4 deaths.

Group 2 included patients with mild systemic disease, an indigo-carmine output in 15 minutes or less, a residual urine of under 15 oz., and a blood urea of 80 or under. The urine was often infected; sometimes the pyuria was marked. In this group 31 prostatectomies were done, with 5 deaths.

Group 3 included patients with marked systemic disease, usually cardiovascular; the residual urine ranged from 1 to 5 pints; the blood urea commonly varied between 80 and 200. In this group were 31 operations with 5 deaths.

Group 4 was made up of those patients who had blood ureas of over 200 and who showed evidence of cardiorenal failure, with edema, uremic anemia, or vomiting. This group (expressing an attempt to find the limit of "aseptic prostatectomy") included only 6 patients, with 4 deaths.

Thus there was a total mortality for the 300 patients of 6.0 per cent. This mortality cannot of

course be compared with previous figures for this operation because of the lack of figures in other statistics with reference to the preoperative mortality with suprapubic drainage or with the indwelling catheter, that is, "septic prostatectomies." However, a comparison can be had with the former results obtained by the author in that the present mortality is probably about one-fifth of what it was 6 years ago. JOHN W. BRENNAN, M.D.

Barner, J. L.: Teratoma of the Testis; Report of 65 Cases. *Am. J. Roentg.*, 1945, 54: 257.

Teratoma of the testis was observed in 65 patients during a 33-month period. These cases made up 7.86 per cent of all the malignancies admitted to the author's hospital. The average age of the patients was 28 years.

The cause of testicular tumors is unknown. It is thought that abnormal development, especially ectopic or undescended testes, may be a factor. This was present in 3 of the 65 cases. Trauma was mentioned in 21 instances, but apparently the trauma served only to direct attention to the tumor. Trauma as an etiological factor is still disputed.

Early diagnosis is of prime importance. Twenty-seven (41.5%) of the 65 patients were treated for other conditions before a malignancy was suspected. (The rapidity of the development of metastases in teratomas is unbelievable at times. The abstractor recently saw a patient who was treated for a hydrocele. The chest film was negative. In less than 1 month the patient developed a large liver which filled the epigastrium, and the chest film revealed numerous metastatic depositions throughout both lung fields.) Forty-five of the patients (68%) had painless swelling; 14 (21.5%) complained of pain; and 6 (9%) complained of a feeling of heaviness or dragging. Three-fourths of all the patients were treated within a year of the time the tumor was noted.

The history and course of the condition may be suggestive of testicular tumor. A smooth rapidly growing mass, inguinal adenopathy, neuralgia, tenderness to palpation, and nontransillumination to light are a few of the diagnostic findings. Teratomas must be differentiated from epididymitis, hydrocele, hematocele, gumma, and tuberculous and chronic orchitis. If there is doubt as to the diagnosis, a surgical exploration should be performed. Most of the tumors were found to be of the embryonal type, adenocarcinoma, or embryonal carcinoma.

Treatment consisted of a combination of surgery and irradiation. The surgery was radical orchiectomy and, when possible, it was followed by irradiation on the third to fifth day. The cases were divided into those with no metastasis or with symptoms of less than 6 months, and those with metastasis or with symptoms for longer than 6 months. In the first group, the operative site, midabdomen, epigastrium, posterior sacrum, abdomen, and flanks were treated. In the second group, in addition to the aforementioned fields, the lateral abdomen, chest, and supraclavicular region were also treated. The following factors were used: 220 kv.p., 15 ma., 50 cm. target skin distance, from 0.5 to 1 mm. of copper plus 1 mm. of aluminum for filter, and from 200 to 250 r per each of two portals daily for a total dose of between 1,600 and 2,000 r per portal.

A careful follow-up was made, and after 33 months only 7 of the 65 patients who had been treated had died. The others were living and well.

MAURICE D. SACHS, M.D.

MISCELLANEOUS

Forsythe, W. E., Jr., and Karlan, S. C.: Enuresis in Young Male Adults. *J. Urol.*, Balt., 1945, 54: 22.

All cases of enuresis warrant complete study. A history is taken and specific urological questions are asked. The physical examination and laboratory investigation are routine. The patient is then placed under the joint observation of the urologist and the neuropsychiatrist. The former has excretory urograms made and performs cystoscopy and such other urological procedures as appear indicated. The patient is examined both neurologically and mentally. A cystometric study is then made and studied in detail. Emphasis should be placed on the importance of cystometry in the study of enuresis. By this means intravesical pressure changes which are produced by detrusor tone or activity in response to the introduction of known amounts of fluid are observed. Correlated with this is a sensory analysis. The authors prefer the use of a modification of the Munro water cystometer.

The following components are observed:

1. Sensation
2. First desire to void
3. Capacity. This is normally from 350 to 450 c.c. and, as expected, varies with the reflex arc.
4. Intravesical pressure curve
5. Uninhibited contractions
6. Initiation of urination
7. Residual urine.

The following classification of the causes of enuresis therefore seem quite logical: (a) organic, urogenital or neurological, and (b) functional.

The treatment of enuresis is based primarily upon making a correct diagnosis. It is quite obvious that attempted psychotherapy is time wasted when the true cause is organic. In cases in which local uropathy is discovered, eradication of this process is usually followed by cessation of the symptoms. The good results which follow urethral dilatation, silver instillation, and vesical lavage may have been due in many instances to the inadvertent treatment of the local pathology.

The treatment of neurological cases remains very difficult. In addition to the old remedy of limitation of fluids, parasympathetic depression may aid in reducing the uninhibited contractions. In general, it has been found that these cases at best respond slowly to therapy. JOHN A. LOEF, M.D.

Free, A. H., Huffman, L. F., Trattner, H. R., and Brown, H. B.: Oral Penicillin in the Treatment of Gonorrhea. *J. Lab. Clin. M.*, 1945, 30: 738.

All of the patients in the authors' series were diagnosed as having gonorrhea by means of positive cultures, clinical signs, symptoms, and history. The penicillin used was in the form of a dry powder contained in gelatin sleeve capsules. Each patient ingested a total of 1,600,000 units of penicillin over a 2 day period. The dosage schedule required that 100,000 units be taken every 2 hours during the waking period. Two urethral cultures in the male patients, and 2 urethral and 2 cervical cultures in the female patients were obtained during the 10 day period following treatment, and in most of the patients a third culture was obtained at a somewhat later time.

Altogether 14 patients with gonorrhea were treated by the technique described. In all instances only negative cultures were obtained following the treatment, and all of the clinical signs and symptoms of gonorrhea disappeared.

JOHN A. LOEF, M.D.

Cutting, W. C., Halpern, R. M., Sultan, E. H., Armstrong, C. D., and Collins, C. L.: Penicillin by Mouth for Gonorrhea. *J. Am. M. Ass.*, 1945, 129: 425.

Extensive trials of the administration of penicillin by mouth, with various enteric coatings and adjuvants to protect the penicillin or promote its absorption, resulted in the following useful combinations: mixtures of penicillin with tri-isopropanolamine, trisodium citrate, or sodium carbonate enclosed in a resin-cellulose plastic enteric coating.

When the dose of penicillin was 50,000 units, administered every 2 hours for 10 doses, these superior combinations produced penicillin blood concentrations of from 0.02 to 0.05 unit per cubic centimeter.

Fifty-three cases of acute gonorrhea were treated with several of the most promising combinations, with cures in 38, or 72 per cent.

Treatment of infections with highly susceptible bacteria by orally administered penicillin appears to be feasible.

JOHN A. LOEF, M.D.

Dyar, R., Scholtz, J. R., and Hammond, E. C.: Penicillin Treatment of Previously Untreated Acute Gonorrhea. *Am. J. Syph.*, 1945, 29: 562.

Four hundred and ninety-eight patients with previously untreated acute gonorrheal urethritis were treated with penicillin. Eighty-three per cent of those treated with 50,000 or 75,000 Oxford units were considered cured on the basis of negative smears and/or cultures thereafter. Ninety-one per cent of those treated with 100,000 units of penicillin were considered cured on the same basis. All patients failing to respond to the first treatment were subsequently cured by retreatment with penicillin. The proportion cured did not vary significantly with the duration of symptoms prior to the institution of treatment. There were no treatment reactions of significance.

Cases responding to penicillin therapy showed early clinical improvement and were generally bacteriologically negative 24 hours after treatment. The validity of the criteria of cure used was established by the re-examination, from 6 to 12 weeks after the last treatment observation, of 119 of the individuals originally considered cured on the basis of 21 days of post-treatment observation. Among the 119 cases selected at random, there was a positive smear or culture, after rigorous tests of cure, in only one.

JOHN A. LOEF, M.D.

Lydon, F. L.: Trichomonas Vaginalis Infection in the Male. *Brit. M. J.*, 1945, 2: 384.

The frequency of trichomonas vaginalis infection in the female has for many years been recognized, but the similar infection in the male has not received the attention it merits, since it is by no means an uncommon cause of urethritis. During the past few years the author has seen numerous cases of this nature, some of which he was fortunate enough to observe over many months, and the results of his investigations are put forward in the hope that with a higher index of suspicion when confronted with a "urethritis," especially one showing a tendency to relapse and chronicity, other workers will discover that many of the cases are due to infection with trichomonas vaginalis.

As for all chronic conditions, especially when subject to remissions, there are a multiplicity of "cures." It is the author's opinion that, at this time, there is no specific treatment for the condition, although many methods have been advocated to bring about amelioration of the signs, because the propensity to relapse is similar to that in the female even when no further exposure is possible. It is essential, therefore, to prolong surveillance over many months. Recently the administration of mepacrine hydrochloride, both in the usual dosage and by the intensive method now employed for malaria, has been tried, but although the discharge decreased to a very slight amount and the active organism disappeared from the discharge, the tell-tale resisting cell could still be found on careful search. This drug may prove a failure, too, when subjected to the test of long surveillance.

JOHN E. KIRKPATRICK, M.D.

Lehr, D.: Experimental and Clinical Studies with Sulfacetimide (p-Aminobenzenesulfonylacetylamide): Toxicity and Efficiency in Bacillary Infections of the Urinary Tract. *J. Urol.*, Balt., 1945, 54: 87.

Comparative studies of the acute and chronic toxicity of the sodium salts of sulfacetamide, sulfadiazine, and sulfanilamide have been carried out in albino rats, by the intraperitoneal route of drug administration.

Figured on the basis of the medium lethal dose (LD50), sodium sulfacetamide possesses by far the

lowest acute toxicity, being about five times less toxic than sodium sulfadiazine, and more than seventeen times less toxic than sodium sulfanilamide. Based on mean values of the highest blood levels reached with fatal dosages of the three sulfonamides, the relationship of the acute toxicity of sulfacetamide, sulfadiazine, and sulfanilamide is as 1 to 2 to 10. (This relationship is expressed for equal weight amounts of the respective sodium salts.)

The chronic toxicity of sodium sulfacetamide is likewise lower by far than the toxicity of sodium sulfadiazine. At a daily dosage level of 0.6 gm. per kgm. body weight, continued over a period of 9 weeks, sulfacetamide caused no significant pathologicoanatomical lesions. The equimolar amount of sulfadiazine (0.7 gm. per kgm.), however, invariably produced severe organic damage, particularly in the kidneys, and in many instances also in the aorta.

The mechanism of the nephrotoxic action of the sulfonamides was discussed. The low renal toxicity of sulfacetamide was explained as being due to its high solubility (in water, sulfacetamide is about 115 times as soluble as sulfadiazine) which apparently precluded the serious consequences of massive and long-lasting intratubular deposition of crystals, which occurred from sulfadiazine.

The ready absorption and rapid renal elimination of sulfacetamide as well as its high solubility, particularly in urine, made it possible to obtain high urine concentrations in the presence of relatively low blood levels.

In in-vitro antibacterial experiments, it was found that sulfacetamide exerted a powerful effect against Escherichia coli communior even if very large inocula were used.

In comparative studies of sulfacetamide, sulfathiazole, and their succinyl derivatives, using a streptococcus strain freshly isolated from a patient with infection of the urinary tract, sulfathiazole proved significantly more effective than sulfacetamide in low concentrations (5 to 10 mgm. per cent), whereas in concentrations generally obtained at the bedside under routine treatment (50 to 110 mgm. per cent of the free drug), there was little difference in the antibacterial effect of the two compounds.

Conjugation with succinic acid at the para-amino group decreased the bacteriostatic activity of both compounds very markedly.

The results of these experiments suggest that from a pharmacological and toxicological standpoint, sulfacetamide deserves preference over other sulfonamides now in use for the treatment of infections of the urinary tract. JOHN A. LOEF, M.D.

Keyser, L. D.: Studies in Urinary Calculosis. *J. Urol.*, Balt., 1945, 54: 194.

The author has tried to fit together some of the evidences of the origin of urinary calculi from the physicochemical, bacteriological, and pathological standpoints as revealed by animal experimentation and the study of stone-forming kidneys. He presents the concept of a stone-forming pyelonephritis which parallels in some degree that of other types of crystalline deposition in tissue.

Among the contributions of our generation to stone research, four are outstanding:

1. The demonstration of lithiasis in vitamin-starved animals.

2. The experimental production of stone in animals by excessive excretion of crystalloids such as oxamide, calcium oxalate, and calcium carbonate, with later clinical confirmation of such a hyperexcretory mechanism in hyperparathyroid disease, in gout, and in certain unexplained hypercalcinurias.

3. The production of calculi in animals with type-specific bacteria.

4. Tracing of the morphogenesis of aseptic stone arising on calcium plaques or in crystalline clogged pyramidal tubules.

The implication of each of these different approaches remains intensely controversial as a demonstration of a single cause of stone. The author believes that we must revert to the concept that calculus formation is one and only one of many types of crystalline deposition or lithification in tissues. In other words, urinary calculus is not a disease entity but represents a variable physical form of concrement building which may result from equally variable conditions.

Physical chemists teach us that crystalloid-colloid aggregates arise when water insoluble crystalline matter is deposited in the fibrillary mesh or organic colloids which are proceeding from the state of sol to that of irreversible gel. The electrodynamic surface action of colloidal matter is of great magnitude, and as crystals are caught in the interstices of gelling colloids, they undergo changes in form and in polarity, with rearrangement internally. This results in a variable increase in density and to some extent determines the ultimate form which the crystalloid-colloid aggregate is to assume. Again, this secondary internal crystallization dependent on surface interaction of the forming concrement, determines the lobulation, lamination, Liesegang ring formation, the roughness or smoothness of the surface, the variable densities of surface and inner areas of the stone, and perhaps the size of the concrement itself. The contour of the calculus is, of course, modified by the contour of the calyx or pelvic wall to which it was originally attached. However, the electrochemical surface interaction of forming concrements is of the greatest importance even in this respect. Such a physicochemical concept of concrement building explains the polymorphism of stones seen clinically.

Outstanding among the efforts at dissolution of urinary calculi are the use of acid irrigating solutions, such as dilute aqua regia and phosphoric acid, the use of acidifying drugs and diets by mouth, the production of so-called hydrotrophic substances in greater concentration in the urine, as in the use of sodium benzoate and glycocoll to form hippuric acid by Snapper, Bendien, and Pollak, and the application of calcium-dissolving chemicals such as Al-

bright's citric acid-sodium citrate solution and Suby's solution of magnesium acid-sodium citrate. The latter seems most popular at present. The reported cases of dissolution or partial dissolution of stone for the most part represented dissolution of soft, pultaceous, calcareous material. However, in the many roentgenograms illustrating stone disintegration following these techniques, few show complete dissolution. Nearly always some calcareous material remains. After a 10 year experience most dissolution techniques have been disappointing. The author has had opportunity to try urinary acidification, with intense Vitamin A feeding, diets, and drugs. Continuous or rapidly repeated irrigation of stone-bearing and frequently infected kidneys with nephrostomy tubes, nephrostomy tubes above and ureteral catheters below, tidal irrigators, Y-tube irrigators, and hand syringe techniques have been used. They are time-consuming and sooner or later lead to renal irritation, fever, and urosepsis. After all of them were tried, the use of the simple Y-tube irrigator, controlled by the patient with a No. 10F indwelling catheter, has seemed as good a method as any. Tidal irrigators do not work in the renal pelvis with the Munro, Nesbit-Webb, Suby, or other setup. At best, any irrigator must be attached for a number of days or possibly weeks.

When possible, stones should be removed surgically or cystoscopically. Residual material or rapidly reforming calcification may be removed by irrigation. Of the solvents, Suby's solution "G" is perhaps the best, although it too has been only rarely successful.

As stated above, soft calcareous material and, at times, softer stones can be dissolved. Hard dense calculi of any composition, and especially those with lamination, the oxalate and urate stones, defy dissolution by any method used at present. The dangers of urinary acidification, especially when produced and maintained over long periods of time with ammonium chloride and nitrate, are well known. This procedure may even cause stone formation to become more intense. It is therefore the author's practice to apply stone dissolution techniques for a short period of two or three weeks. If they are not well tolerated, the regimen is stopped.

The author concludes that our present approaches to stone dissolution are unsatisfactory, and the immediate future does not look particularly promising. For this reason, dense calculi, those of oxalate and urate composition, had better be removed surgically if possible. Efforts at eradication of nonremovable calculous material should be approached most conservatively with dissolution techniques. Efforts at dissolution of irremovable stones, such as bilateral staghorn calculi which cannot be successfully attacked by the improved, extended pyelotomy techniques, will rarely be successful.

JOSEPH K. NARAT, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Sheldon, W. H., Thebaut, B. R., Heyman, A., and Wall, M. J.: Osteomyelitis Caused by Granuloma Inguinale. Report of a Case with Cultivation of the Donovan Body in the Yolk Sac of the Developing Chick Embryo. *Am. J. M. Sc.*, 1945, 210: 237.

During the past year several cases of systemic dissemination of granuloma inguinale have been reported. In this article the authors present the history of a patient in whom hematogenous dissemination of the disease seems to be certain.

A 43 year old colored male was admitted to the hospital complaining of pain and exhibiting a large ulceration on his left leg. His past history revealed that he had had a urethral discharge 20 years previously. This was associated with an inguinal bubo which eventually ruptured and drained for a while. Also, about 18 years previously he had an ulcer near the frenulum which healed without treatment. At no time had serologic tests been made, nor had he received any treatment for syphilis.

On admission to the hospital the patient stated that about 6 months earlier he had struck his left shin against a heavy object. The leg was bruised and would not heal. Three months later he injured the same area and an ulcer developed. A month later the left knee became stiff. Five weeks later a penile lesion was noticed by the patient for the first time. It consisted of a small erosion on the dorsum of the penis adjacent to the corona. He further stated that he had lost 45 pounds in weight in the last six months.

The examination showed an elevated granulomatous lesion measuring 7 by 15 cm. on the upper third of the left leg. A second band-shaped ulcer measuring 1 by 2 cm. in width was found encircling the penis just proximal to the corona. There were no lymph nodes palpable in the left inguinal region. Some enlarged nodes were found in the right groin. The laboratory findings were normal except for the sedimentation rate (125 mm. per hour), serum alkaline phosphatase (4.6 Bodansky unit), positive Ducrey and tuberculin tests, and negative Kahn and Frei tests.

A lytic bone defect measuring about 4 cm. in diameter was seen on the roentgenogram of the tibia at the level of the tibial tubercle. The lesion was surrounded by sclerotic bone. Roentgenograms of the other bones were negative except for a cystlike lesion measuring about 1 by 1.5 cm. in the anterior portion of the left rib. Biopsies from the granulation tissue, bone, and bone marrow had the appearance of granuloma inguinale. Donovan bodies were isolated by inoculation of tissue material into a chick embryo yolk sac following the technique described by Anderson. Biopsy of the rib lesion did not resemble granuloma inguinale on histological sections.

The treatment consisted of local application of sulfadiazine and tyrothricin. Fuadin was given intramuscularly at weekly intervals. The tibial defect was packed with iodoform gauze, and the packing was changed at frequent intervals. A split thick-

Fig. 1. The large granulomatous lesion of the left leg. Note the deep ulceration near the upper edge of the lesion which extended into the marrow cavity of the tibia.

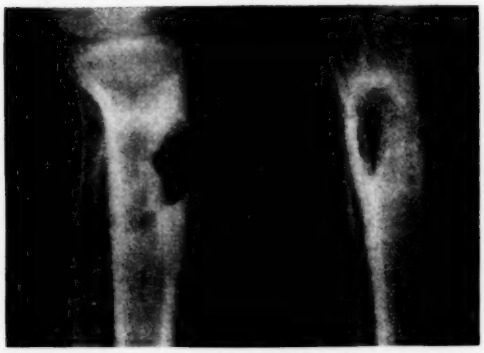


Fig. 2. Roentgenogram of left tibia, lateral and anteroposterior view. Large defect in the tibia with some sclerosis of the surrounding bone and irregular periosteal thickening.

ness graft was applied to the lesion of the leg; 90 per cent of the graft survived.

GEORGE I. REISS, M.D.

Salisachs, L. G.: A Study of Periscapulohumeral Calcifications (Contribución al estudio de las calcificaciónes periescápulohumerales). *Cirug. apar. locomotor*, 1945, 2: 239.

Periscapulohumeral calcifications are an anatomical form of the periarthritis described by Duplay. They may be acute or chronic. In both the acute and chronic forms the symptoms are pain and rigidity of the shoulder. In some cases there are no symptoms at all. These calcifications are generally located in the subdeltoid and subacromial serous bursae or in the tendon of the supraspinatus muscle, the latter localization being the most frequent. They consist essentially of a local calcification caused by an inflammation of the serous bursae which may be due to syphilis or rheumatism, or by necrosis of the tendon due to trauma. There is rarely, if ever, a single severe trauma, but usually rather slight and frequently repeated postural or occupational minimal trauma due to pinching of the tendon of the supraspinatus muscle between the head of the humerus and the acromiocoracoid process.

The treatment of these calcifications is the same as that of the other forms of scapulohumeral periarthritis. The treatment of choice is infiltration of the stellate ganglion with an anesthetic; the author has had good results from the infiltration of percaine followed by the injection of from 2 to 3 c.c. of a 1:100 solution of novocain. Physical methods, such as diathermy, infra-red rays, radiotherapy, and mechanotherapy may be used as adjuvant treatments. If infiltration of the stellate ganglion fails, which has never occurred in the author's experience, forced mobilization should be carried out under anesthesia. Surgical operation is rarely indicated.

The literature on the subject is reviewed and histories and roentgenograms of 7 cases are given.

AUDREY G. MORGAN, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Hellstadius, A.: "Bone Chip" Grafts in Defects of the Long Bones. *Acta chir. scand.*, 1944, 90: 317.

In some cases of bone transplantation the use of bone chips has proved better than the use of a single large bone graft. For instance, in Albee's operation for tuberculous spondylitis some surgeons have used bone chips in place of the single transplant. Matti believes that the bone chips are more resistant than the large graft to infection in the field of operation.

In this article experiments on rabbits are described in which chips of compact bone (with the endosteum and periosteum) were placed in a defect in the diaphysis of one radius, while chips from spongy bone substance were placed in a corresponding defect in the diaphysis of the other radius. On the side on which compact bone was used, new bone was formed more quickly and in larger amounts than on the side on which spongy substance was used, and the differentiation of marrow and cortex took place more rapidly.

In some cases the soft parts around the bone showed a tendency to grow in between the spongy bone transplants. It would seem, therefore, that chips from compact bone are preferable to those from spongy substance in repairing defects in the long bones.

Matti advocated the use of chips of spongy substance in these cases as he said that the bone cells in the spongy grafts survive while those in the compact grafts do not. This opinion was not confirmed in these experiments.

Further experiments were made to determine the relative value of chips of cortex freed from periosteum and endosteum and chips in which the periosteum and endosteum were retained. Grafts of this kind were inserted into defects in the radius and also into the soft parts around the bone. The experiments showed that new bone is formed more readily when the periosteum and endosteum are retained.

AUDREY G. MORGAN, M.D.

Oldfield, M. C.: Iliac Hernia after Bone Grafting. *Lancet*, Lond., 1945, 248: 810.

On 56 occasions, bone grafts taken from the ilium were used in the repair of defects of the face and skull. One patient developed a landslide type of hernia of the cecum into the donor site. When the patient was standing, a protrusion was noticed in the right flank. The hernia was easily reducible. The hernial orifice was about 1½ inches in diameter and the protruding cecum measured about 2½ inches in its greatest diameter. Repair was done under spinal anesthesia, and fascial sutures were used. The fascial strip was taken from the right thigh by means of a Masson's fasciotome.

The patient was kept in bed for a period of 4 weeks, and during the last 2 weeks graduated abdominal muscle exercises were done. He returned to work and suffered no disability.

GEORGE I. REISS, M.D.

Strange, F. G. S.: The Major Amputation Stump in Health and Disease. *Brit. J. Surg.*, 1945, 33: 31.

The ideal amputation stump is regarded by the author as a smoothly contoured and somewhat tapering cone, well balanced, powerful, with full range of movement, and well re-educated muscles, and of ideal length (as recently described by Kelham and Perkins—*Amputations and Artificial Limbs*. London: Oxford Univ. Press, 1942). The skin over this stump should be snugly fitting, underlaid with its own deep fascia, healthy, and meeting at a mobile, linear, and usually terminal scar.

These requisites will best be attained by the avoidance of trauma at operation, all structures being simply cut through and not subjected to crushing or injections of alcohol, as was formerly

done in the case of the large nerve trunks. However, a densely adherent nerve end bulb is not necessarily a painful one. The periosteum is cut through level with the bone end. This is almost invariably the site of a spur, which must be recognized as a normal constituent of an amputation stump.

Avoidance of infection has also been given much thought; however, of all the operations designed to heal by first intention, amputation fails most often. Of the 406 cases, forming the basis of this report, 232 (57.1%) suppurated for a shorter or longer period before healing, and this included 79 consecutive cases treated by the author himself with primary healing in 63 (80%). In a clean case, such as the reamputation in which operation can be delayed for several weeks, primary suture is permissible. It may also be used in the presence of a septic process, when this process is comparatively remote from the intended site of amputation, when it is of long standing, or when it has not yet developed completely. If, however, at the time of removal of the tube in 48 hours, there is evidence of infection, the wound must be reopened and the flaps turned back. The delayed suture technique of Jack and Charnley (*British Orthopaedic Association Meeting*, Roehampton, 1943, 2: 131) is mentioned as an improvement—15 cases healed by first intention, 14 healed with soft tissue infection only, and 3 cases presented severe infections—but still it fell short of the ideal result sought. Secondary suture is performed after 14 days of open drainage of the amputation wound.

There remains, however, a proportion of cases in which the infectious process is too close or too acute for any reasonable hope of primary healing following the use of any of the described methods. In these cases the "first aid" amputation is applicable; this is a very low amputation in which some degree of infection is expected, but which allows plenty of room for reamputation when the sepsis has been controlled. The remaining method is the guillotine amputation, which because of the lack of flaps can be carried out very close to the lesion if necessary, and thus allows as much room as possible for subsequent reconstruction.

The postoperative management of all the amputations, except the guillotine, was the same; that is, a drainage tube and gauze dressing, with tight elastic bandage enveloping the entire stump, were used, and a posterior or other splint was applied for 12 days to forestall subsequent flexion contractures. The drain was removed after 48 hours, and the sutures on the twelfth day; no daily dressings, probing, or squeezing were resorted to for removal of the hematoma. Nonresistance exercises were begun after 12 days and resistance exercises after 3½ weeks. The stump was ready for limb-bearing after from 4 to 6 weeks.

In the guillotine type of amputation a Bunyan-Stannard envelope (*Brit. Med. J.*, 1941, 2: 1) is applied and after irrigation with hypochlorite, light skin traction in a Thomas knee splint or Jones humerus extension splint is used; on occasion a Thiersch graft is applied as soon as the bone end is covered by granulations. This method is applicable to the stump which breaks down and leaves an open wound. The striking thing about this Thiersch graft is that it often shrinks down to where it may later be excised with subsequent approximation of the previously nonapproximating skin edges.

In the author's material (406 cases) there were 101 reamputations; these operations are indicated for completion of the two-stage amputations for certain types of adherent scars, for repeatedly ulcerating scars when there is not enough skin to allow excision and suture, and when there is no stump tolerance of the vascular type. However, these operations should wait until the amputation stumps have been healed for 6 weeks. To perform reamputation in the presence of an open wound is a violation of the basic principles of surgery, and cannot be condoned even when associated with the use of the sulfonamides or penicillin.

JOHN W. BRENNAN, M.D.

FRACTURES AND DISLOCATIONS

Soto-Hall, R.: Fractures of the Carpal Scaphoid. *J. Am. M. Ass.*, 1945, 129: 335.

The treatment of recent fractures of the carpal scaphoid is almost a solved problem, as has been shown by the many studies of end-results in the last few years; however, the author believes that too many surgeons fail, either because they are not vigilant in noting and following the most minute details in diagnosis and treatment, or because they experiment with methods which are not founded on sound anatomic principles.

Fractures of this type must be diagnosed immediately after the injury, and failure to do so is one of the main causes of nonunion.

The history of a fall on the outstretched hand, tenderness in the anatomic snuffbox, and pain at the point on percussion of the fully extended thumb should be almost conclusive evidence. Should the initial roentgenograms fail to show the fracture, the clinical findings should be used as presumptive evidence, and the only course to be followed is immobilization of the wrist for a period of 3 weeks. After this, should radiographic studies again be negative, the patient's ligamentous injury will have been helped by rest, and if, as so often happens, the films show a bone injury, he is already started in the proper path of healing.

Certain precautions in taking roentgenograms are desirable. For careful comparison with the uninjured wrist, lateral views should be taken with the two wrists in the same position, and this can best be attained by putting the palms together with the fingers pointing forward in a "praying position." The posteroanterior views must always be taken in complete ulnar flexion, as in this position the long axis of the scaphoid is visible; and at least two obliques are needed to complete the study, with the palmar and dorsal surfaces of the wrist alternately next to the plate. Fractures involving a small part

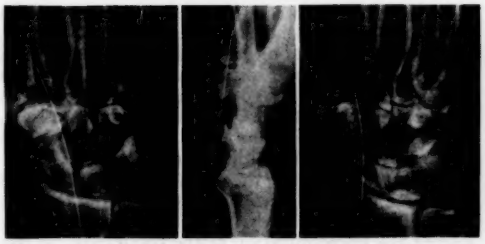


Fig. 1. Experimentally produced fracture of the carpal scaphoid in a cadaver. A wire has been threaded through the flexor pollicis longus tendon. These views show the intimate relationship of this tendon to the scaphoid, particularly to the area of the tubercle. In these specimens any movement of the interphalangeal joint of the thumb produces a definite change of position of the fractured fragments. The tendon passes beneath the transverse carpal ligament and enters the osseoaponeurotic canal, of which the scaphoid is a wall, then passes distally to be inserted in the distal phalanx of the thumb. Note that in the anteroposterior view the fracture is not visible, whereas in the oblique view it is readily seen.

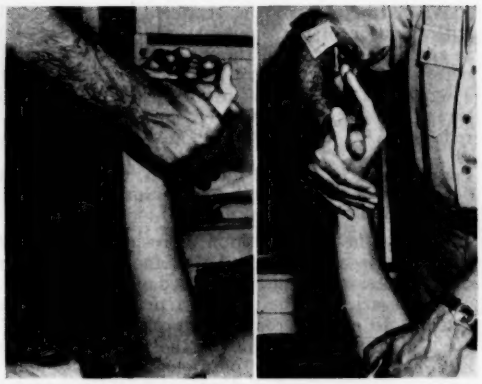


Fig. 2. Two views illustrating maneuver for manipulating the wrist into correct position of full radial flexion; 20 to 30 degrees dorsiflexion of the wrist with the base of the thumb in full abduction but its metacarpophalangeal and interphalangeal joints relaxed in slight flexion, the heel of the physician's hand pressing against the heel of the patient's hand.

of the proximal pole should be differentiated, because in this type the blood supply is poorest and the prognosis therefore is least favorable.

Fracture of the tubercle offers little difficulty, since the bone in this area is covered by periosteum and is well vascularized. This is a rare lesion. Full healing should take place in from 3 to 4 weeks by simple immobilization of the wrist.

In the treatment of fractures through the body, the first step should be to determine accurately whether any displacement is present. The lateral film should be carefully studied for angulation. In the presence of displacement, reduction can be obtained by traction on the thumb while the snuffbox is molded by the surgeon's fingers. Once alignment has been attained, the fragments can be impacted and properly immobilized by placing the wrist in full radial flexion with from 20 to 30 degrees dorsiflexion, and pressing the base of the thumb just below its proximal crease into full abduction.

Proper immobilization of the thumb is important because by its inclusion more complete fixation of the wrist can be attained and any active movement of the thumb involves the long flexor tendon and the abductor pollicis which, by its intimate relationship with the scaphoid, produces motion of the fragments.

Care must be taken to force the thumb into abduction at its base rather than at its tip, since the latter procedure leads either to strain or to subluxation of the metacarpophalangeal joint. In this strained position recovery of function takes place much more slowly. The metacarpal, therefore, should be abducted, and the thumb relaxed in slight flexion.

An anterior skin-tight plaster splint is first applied and then one layer of circular flannel bandage is wrapped around the extremity. This is followed by a circular plaster splint. It is important that the plaster be carried as close to the elbow as possible and still allow full flexion of this joint, and, as previously mentioned, the plaster should extend to the middle of the thumb nail and to the metacarpophalangeal joint of the fingers. Mobilization of this area in scaphoid fractures will not produce the stiffness one always notes following Colles' fractures.

Immobilization should be complete and undisturbed for at least 9 or 10 weeks; a large percentage of fractures will heal in this time, but a period of from 4 to 5 weeks longer may be necessary. Roentgenograms and clinical examinations should determine whether this further immobilization is desirable. The presence of local tenderness in the anatomic snuffbox, or pain on percussion on the tip of the thumb, associated with inconclusive radiological evidence of union, should warrant further immobilization. Sometimes the clinical evidence of union will appear before it is demonstrated in the roentgenogram.

Certain authors have recommended prolonged immobilization, sometimes as long as from 12 to 18 months. The author does not concur with this policy, because 95 per cent of fractures will have united in from 4 to 5 months and when union is delayed beyond that time there are certain complications which should be treated surgically rather than by further splinting. These are malposition of the fractures, interposition of strong fibrous bands, aseptic necrosis, or an uncontrolled very small fracture of the proximal pole. In the latter injury, in which only one-sixth of the scaphoid is involved, an excision of the small fragment (if three months' splinting fails) results in better function than very prolonged immobilization.

When fractures of the scaphoid are associated with luxation of the semilunar bone, which occurs in about 12 per cent of the cases, the wrist must of necessity be held in slight volar flexion for the first 4 weeks. If it is placed in dorsiflexion in order to treat the scaphoid fracture, the semilunar may redislocate. ROBERT P. MONTGOMERY, M.D.

Pendergrass, E. P., and Lafferty, J. O.: Roentgen Study of the Ankle in Severe Sprains and Dislocations. *Radiology*, 1945, 45: 40.

Usually the interpretation of roentgenograms of the ankle is confined to the diagnosis of bone or cartilage lesions because it is based only on anatomical observations. The present article represents an attempt to employ roentgenography for the diagnosis of soft-tissue lesions of the ankle by taking into consideration the physiology of this joint.

The authors noticed that multiple roentgenograms of a recently severely sprained ankle which was manipulated into different positions on the raying table showed an abnormal lateral rotatory mobility of the talus and a tendency of the talotibial joint to subluxate, whereas films of 6 normal ankles failed to demonstrate this phenomenon. After four weeks of immobilization this abnormality could no longer be demonstrated. (The case was complicated by an old ununited fracture of the internal malleolus which was thought not to have any bearing on this observation).

The authors come to the conclusion that in cases in which conventional anteroposterior and lateral films of the ankle in neutral position fail to show any bone lesion, additional anteroposterior films should be taken with the foot held in forced inversion and eversion as well as in flexion and extension. This type of filming is also recommended for cases of recurrent painless ankle sprain, instability of the ankle, abnormal mobility of the ankle joint with a depression in front of the external malleolus, and for cases which are to be given procaine injection treatments. The purpose of this examination is to demonstrate a tear or extreme stretching of the entire external lateral ligament, or at least of its anterior and middle fascicles. In simple sprains only the anterior fascicle is involved according to Elmslie. No x-ray findings are then to be expected.

Permission for the manipulation of the ankle necessary for this type of filming should be obtained from the referring physician. The injection of from 5 to 10 c.c. of procaine around the point of maximal tenderness prior to the examination is suggested for painful cases. GERHART S. SCHWARZ, M.D.

Cano, L. S., and Valdés, E. R.: Mechanical and Biological Problems in Nailing the Marrow of Fractured Bones by Kuentscher's Method (Los problemas mecánicos y biológicos del enclavijamiento medular de Kuentscher). *Cirug. apar. locomotor*, 1945, 2: 193.

The history of the method of inserting metal nails or pegs into the marrow cavity in fractures of the long bones is reviewed. Various metals were tried but in 1940 Kuentscher described his method of using V-shaped inserts of stainless steel, which seems to be the best method so far devised. With the use of this metal there is no corrosion and immobilization is so complete that the use of plaster is not necessary.

This method fulfills the three requirements in the treatment of fracture: that the fragments be accurately reduced, that they be immobilized in good position until consolidation takes place, and that the muscles and joints be exercised as much as possible during the immobilization of the fragments. It has been found that the presence of a large foreign body in the marrow cavity is tolerated very well and that the pressure exercised by the nail furthers callus formation. The marrow itself also plays a part, but not the predominant part, in callus formation. Callus formation takes place for the most part from metaplasia of connective tissue. The presence of the nail may stimulate callus formation by a process of chemical irritation and by stimulation of phosphatase production, although the authors have not been able to demonstrate the latter.

The blood picture usually shows a more or less marked eosinophilia and an increase of reticulocytes for some days after the insertion and removal of the nail. Experimental work has shown that some fat passes into the lungs but not enough to endanger the life of the patient. Infection is rare in these cases and when it occurs, it is mild.

The chief indication for the use of this method is in simple fractures of the diaphysis of the femur, especially in elderly patients in whom continuous extension or plaster casts are dangerous. It is also very useful in corrective osteotomies, in viciously consolidated fractures, and malformations of the joints. It is not so definitely indicated in compound fractures, gunshot fractures, and fractures of the tibia, humerus, and forearm.

Thirteen cases treated by the authors are discussed, 6 being simple fractures of the femur, 1 a pathological fracture of the femur from metastastic carcinoma, 3 simple fractures of the tibia, 1 a compound fracture of the tibia, 1 a pseudarthrosis of the humerus, and 1 a pseudarthrosis of the radius.

AUDREY G. MORGAN, M.D.

Rodríguez, F. D.: The Surgical Treatment of Pathological Fractures (Tratamiento quirurgico de las fracturas patologicas). *Rev. espan. cir., traumat. y ortop.*, 1945, 13: 17.

When fragility of bones is due to general causes and the whole skeletal system is involved the treatment is chiefly medical, but when bone disease is caused by localized infections or cysts the resultant fractures can be treated surgically. In such cases there is a localized rarefaction of bone and always a deficiency of protein. One of the principles of treatment is to remove the periosteum, together with fragments of cortex, of a normal part of the bone, and add these fragments to the blood clot which has formed at the site of the fracture. This provides a

medium for fixing the calcium phosphates and initiating regeneration of bone. Blood calcium is an important factor in osteogenesis.

Two cases are described, the first in a young woman who suffered a fracture of the middle third of the left humerus merely from her husband taking her arm. The bone could be doubled back on itself at the site of the fracture without any pain. The roentgenogram suggested hydatid cyst and this diagnosis was confirmed by biological tests. The cyst was destroyed by surgery and for some days destruction of the parasites was continued chemically by means of a mild solution of formol introduced into the marrow cavity of both fragments through drains. When all the echinococci were thought to be destroyed, hyperemic treatment was begun with short waves, hot fomentations, and Bier's passive congestion. During the days that this treatment was given the site of the lesion was irrigated daily with rivanol solution to maintain an acid reaction. When the roentgen and clinical pictures suggested that osteogenesis had begun, an alkaline solution was substituted for the acid one. (Mineralization of the protein substance is best brought about in an acid medium.) When osteogenesis was at its height a plaster cast was applied and the patient sent home. After 6 months she returned with a completely consolidated fracture and good function of the arm, but the bone had healed in a vicious position.

The second case was that of a young girl 12 years of age with a cyst which was caused by localized osteitis. This case was treated by the insertion of a nail into the marrow cavity of the two fragments (Kuentscher's method). The fracture was in the upper third of the femur. Fixation was perfect and after a week the patient could move the joint, and after 25 days she was able to get up and walk. This treatment avoided the muscle atrophy and rigidity of the joint which is sometimes caused by prolonged rest.

The article is illustrated with roentgenograms of both cases and photographs of the second patient showing the excellent results of treatment.

AUDREY G. MORGAN, M.D.

ORTHOPEDICS IN GENERAL

Herz, R.: Herniation of Fascial Fat and Low Back Pain. *J. Am. M. Ass.*, 1945, 128: 921.

The author reports the cases of 6 female patients with low back pain who recovered completely following the removal of a tumor in the low back region. The tumor consisted of a "fat hernia" through the superficial fascia in the lumbar and gluteal areas. In most instances histological examination of the excised fatty mass revealed fat lobules and some fibrous tissue. The blood vessels showed perivascular proliferation, thickened walls, and congestion.

In many of the cases, several nodes were palpable in the lower back region. Injection of 1 per cent novocain into the small, hard masses alleviated the low back pain. Some patients complained of pain in the left or right leg, associated with the low back pain, and this pain also disappeared when the novocain injected into the nodes had localized in the low back region. All patients who responded favorably to the local injection of novocain had complete relief after the "nodes" had been excised.

Copeman and Ackerman report similar findings in 14 soldiers with back pain.

GEORGE I. REISS, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Crafoord, C., and Nylin, G.: Congenital Coarctation of the Aorta and its Surgical Treatment. *J. Thorac. Surg.*, 1945, 14: 347.

It was demonstrated by one of the authors in an experimental study on dogs that the flow of blood to all the organs could remain suspended for as long as twenty to thirty minutes without any subsequent signs of organic damage, provided an adequate flow to the brain was secured. This circulation to the brain was maintained by creating anastomoses between the carotid and jugular vessels of an animal of the same size. On the strength of this observation, Crafoord, in certain patients with a patent ductus arteriosus, took the risk of placing clamp forceps on the aorta above and below the point of entry of the duct into this artery, and of keeping them attached during the time necessary to divide the duct and suture the aorta. Although in one of the patients this part of the operation took 27 minutes to perform, no noticeable disturbances were observed in the patient's internal organs.

The question arose as to whether it might not be possible to treat congenital coarctation of the aortic isthmus by surgical means. Coarctation of the aorta is a fairly common abnormality, and knowledge of the congenital deformity has accumulated in the last few decades. The anomaly has been known for nearly 200 years. In her classical work on congenital cardiac disease, Abbott found 142 cases among 1,000 cases of congenital cardiovascular defects.

The constriction of the aorta is localized just below or at the insertion of the ductus arteriosus. The narrowing may be very slight, or there may be complete obstruction of the aorta. The aorta is not usually dilated above the constriction, but the part proximal to the obstruction may be thin-walled and hypoplastic. The descending aorta is of the same size as the upper portion, but very often it is partly obliterated. The deformity is often associated with other cardiovascular anomalies, such as bicuspid aortic valves. Anomalies of the aortic arch are frequently found.

Coarctation of the aorta in its classical form is easily recognized. The most important sign is the increased blood pressure in the upper part of the body. Some cases of coarctation may occur, however, with normal blood pressure in the arms. Every young person with hypertension should be examined at first to find out if he has a coarctation. If he has no pulsations in the popliteal artery, or if the blood pressure is lower in his legs than in his arms, then it should be realized that there may be coarctation. In general the average age at death in Abbott's series was 32 years.

The authors report 2 cases, one of a 12 year old boy, and the other of a 27 year old farmer, both of whom were operated on to relieve congenital coarctation of the aorta. The details of the findings before and after the operation are presented. In both patients the aorta showed conical narrowing from the origin of the subclavian artery, and the conical constriction between the coarctation and the point of departure of the subclavian artery was much longer in the boy than in the farmer.

When re-examined about 6 months after operation, both patients were in excellent health. The boy returned to school and the farmer worked a little at home. In the first case, the systolic blood pressure in the left arm was 130 mm. Hg, and the diastolic pressure was 80; in the left leg the systolic pressure was 150, and the diastolic pressure 80 mm. Hg. In the second case, the systolic blood pressure in the left arm was 145 and the diastolic pressure was 90 mm. Hg.; in the left leg the systolic pressure was 170 and the diastolic pressure 90 mm. Hg.

It is remarkable that in both cases normal conditions re-established themselves regarding the blood pressure, so that in both cases the blood pressure in the legs was a little higher than in the arms and no hypertension is now present. This postoperative effect is of considerable interest and is in favor of the mechanical theory of hypertension in coarctation.

HERBERT F. THURSTON, M.D.

Agar, H., Rowlands, J., and Ogilvie, W. H.: Arterial Aneurysm following Injury to Iliac Vessels. *Brit. M. J.*, 1945, 2: 451.

The 2 cases reported by the authors are examples of arterial aneurysm following war wounds. In each case, ligature of more than one iliac artery was necessary. The operations were accompanied by profuse and rapid hemorrhage, to combat which, profuse and rapid transfusion was necessary. Recovery was undoubtedly due to the promptness and completeness with which the blood loss was made good.

In each of these patients the surgeon was faced, during the course of the operation, with hemorrhage at a rate with which transfusion could not possibly keep pace, and the only way in which an immediate fatal issue could be avoided was by the application of a temporary packing, and interruption of the operation until the circulatory volume had been restored to a reasonable level.

Detailed clinical histories and the findings in the 2 cases are presented—an aneurysm of the buttock in the first patient and a retroperitoneal aneurysm in the second patient. In the first case, 14 pints of blood and 4 pints of plasma were given during the operation, and a total of 27 pints was given during the first 4 days, from which there was no reaction.

In commenting, the authors note that in the one case in which both internal iliac arteries were tied, the pelvic organs, which should have suffered maxi-

mum deprivation, did not reveal evidences of damage. The heel, supplied by the external iliac artery, which was not tied, showed arterial gangrene.

In the second case the nutrition of the limbs never seemed to be in danger, even though not merely all the iliac arteries, but the epigastric anastomosis which forms the most obvious collateral channel, had been tied. The details of the operation for the repair of the retroperitoneal aneurysm are presented.

The authors note further that one of the most striking advances in surgery during the last 4 years is the progress that has been made in the use of whole blood. The advantages of an adequate blood bank for needed massive transfusions are pointed out and described. While blood transfusion undoubtedly has its dangers, these dangers are associated with the giving of blood to those who are gravely ill and who have been repeatedly transfused over a long period. Blood from a blood bank, properly prepared and given, seems to have no dangers in the type of massive post-traumatic hemorrhage in which it offers the only means of saving life. HERBERT F. THURSTON, M.D.

Zukerman, C. M.: Thrombophlebitis of the Cubital Veins in Blood Donors. *West. J. Surg.*, 1945, 53: 311.

Among approximately 285,000 venepunctures performed at the Blood Donor Center, Chicago, Illinois, there was found to occur 12 cases of thrombophlebitis in the cubital veins following venesection. Of these, 11 were in females and 1 in a male. The most important predisposing factors are listed as trauma to the vein wall and slowing of the blood flow by means of (a) the application of a circular bandage, (b) hematoma, (c) systemic reaction, (d) acute flexion of the forearm, or straining of the arm during exercise following venepuncture.

Disability following thrombophlebitis of the cubital veins averaged approximately 4 months.

The best preventive measures are listed as follows:

1. Careful venepuncture technique.
2. The immediate discontinuance of the bleeding if a hematoma develops or if the donor complains that the needle causes discomfort.
3. Preventing the donor from flexing his forearm after venepuncture.
4. A circular bandage should not be applied as a dressing.

Eight of the donors mentioned had given blood for the first time, and 4 were repeat donors; 7 of the donors developed hematoma; 5 donors were bled at the Fixed Center; and 7 were cared for on the Mobile Units.

The author presents a table giving the essential data on the 12 donors who developed thrombophlebitis. RICHARD J. BENNETT, JR., M.D.

Silbert, S.: Thromboangiitis Obliterans. *J. Am. M. Ass.*, 1945, 129: 5.

The criteria for the differential diagnosis between thromboangiitis and arteriosclerosis in patients between 40 and 50 years of age are given as follows:

Thromboangiitis obliterans
- Patient appears younger than his age
- Hair normally pigmented
- No arcus senilis
- Retinal arteries normal
- Blood pressure usually low
- Radial and temporal vessels soft
- Upper extremities frequently involved
- Femoral arteries frequently closed
- No calcification of vessels on x-ray examination
- Blood volume usually diminished
- Symptoms of coronary artery sclerosis rare
- Aorta appears normal on x-ray examination
- Albuminuria rare
- History of migrating phlebitis frequent

Arteriosclerosis
- Patient appears older than his age
- Hair usually gray
- Arcus senilis frequently present
- Retinal arteries usually sclerotic
- Blood pressure often high
- Radial and temporal vessels thickened and hard
- Upper extremities seldom involved
- Femoral arteries seldom closed
- Calcification of vessels on x-ray examination frequently seen
- Blood volume usually normal
- Symptoms of coronary artery sclerosis frequent
- Aorta sometimes appears elongated on x-ray examination
- Albuminuria not uncommon
- History of migrating phlebitis rare

One hundred patients with thromboangiitis obliterans have been followed up for more than 10 years. All of them stopped smoking at the beginning of treatment and have not resumed since. In all of the patients the disease has remained completely arrested following the initial period of treatment.

Thromboangiitis obliterans is caused by smoking in individuals constitutionally sensitive to tobacco. JOHN J. MALONEY, M.D.

Chapman, E. M., and Linton, R. R.: Mode of Production of Pulmonary Emboli. *J. Am. M. Ass.*, 1945, 129: 196.

The authors believe that acts of straining such as holding the breath in inspiration and making an expiratory effort with the glottis closed, especially by those confined to bed from illness or operation, commonly result in sudden and often fatal pulmonary embolus.

The dramatic plugging of the pulmonary arteries by clots released from the leg veins after straining on a bedpan has been witnessed probably more often by nurses than by doctors.

There is a rise of several centimeters in the arm vein pressure during the forced expiratory effort with the glottis closed. The difference between this reading and the reading in the leg when the patient is recumbent is probably due to the fact that the

venous reservoir drained by the superior vena cava is much smaller and more subject to pressure by muscles and other structures. However, when the patient is sitting in the bedpan position there is a great rise in the normal venous pressure in the legs (hydrostatic effect), and this in turn shows a greater increase on forced expiratory effort.

The release of mural thrombi that so often lie in the leg veins is due to the fact that the venous pressure and volume in the leg rise sharply during forced expiratory effort with the glottis closed. Associated with this rise in the venous pressure, there is a temporary impeding of the return of the blood to the heart, so that the peripheral veins become distended with blood, and this may loosen an insecurely attached mural thrombus. With the drop in venous pressure during the next inspiration, the dammed venous blood rapidly empties from the peripheral veins, washing with it any loosely attached thrombus. STEPHEN A. ZIEMAN, M.D.

Hampton. A. O., Prandoni, A. G., and King, J. T.: Pulmonary Embolism from Obscure Sources. *Bull. Johns Hopkins Hosp.*, 1945, 76: 245.

Ten cases are reported in which acute chest conditions appeared to have been caused by pulmonary embolism, with or without infarction. The emboli originated from various venous sources in ambulatory, active individuals. Careful examination failed to show any signs of heart disease, or of vascular disorder prior to the first embolic episode, with one exception. In 3 patients the source of embolism never became clear. No specific common denominator that could reasonably be supposed to have caused phlebothrombosis and embolism was elicited. There were 8 army officers in the group, which suggests that exertion may be a factor. At the time of admission there was no obvious sign of venous thrombosis except in one patient who had a thrombosed hemorrhoid. Accurate diagnosis in such cases is exceedingly difficult at the onset, and none of the patients was admitted with a correct diagnosis. One was thought to have primary, atypical pneumonia, 1 pericarditis with effusion, 1 ruptured peptic ulcer, 1 metastatic carcinoma of the lung, 1 angina pectoris, and 2 were thought to have coronary occlusion.

Roentgenograms of the chest are not very helpful at the onset, since the shadow of infarction does not develop until a day or two have elapsed. In general, dyspnea was more prominent than pain. A dull pain in the base of the neck or in a shoulder, followed by pain in the axilla, should suggest pulmonary embolism. Elevation of the temperature within twenty-four hours of the first symptom is more suggestive of embolism than of coronary occlusion. Blood spitting occurs in less than half of the cases, and then, only after infarction has occurred. The most difficult differentiation is between embolism from a silent peripheral source and embolism from myocardial infarction. Serial electrocardiograms and phlebograms usually elucidate the diagnosis. The authors found phlebograms very helpful in the diagnosis and had no serious results from the procedure. Criteria for the interpretation of phlebograms, roentgenograms, and electrocardiograms are recorded.

The treatment consisted of heparin and dicumarol anticoagulant therapy, plus rest and elevation of the part affected by thrombosis or phlebitis.

JOHN L. LINDQUIST, M.D.

Golodner, H., Morse, L. J., and Angrist, A.: Pulmonary Embolism in Fractures of the Hip. *Surgery*, 1945, 18: 418.

A patient who suffers a fracture of his hip presents ideal conditions for the development of venous thrombi in the lower extremities. The blood stream is slowed by the complete voluntary immobilization of the extremities to avoid painful movements at the fracture site, by the associated reflex vasospasm induced by the fracture, and by the impaired cardiac circulation and the inadequate peripheral circulation of the aged group. Concomitantly, changes in the chemical composition of the blood conducive to thrombosis formation result from the liberation of tissue ferments by the lacerated muscles, ligaments, and bone at the fracture sites. Intimal damage occurring when the patient is bedridden is enhanced when spicas or Wilkie boots are utilized because of the greater pressure exerted against the calf veins by these plaster of Paris encasements.

The most dangerous type is the "phlebothrombosis," or silent propagating thrombus, because it lacks local symptoms, and therefore no precautions are undertaken. This insidious silent propagating venous thrombus was predominant in Golodner's series; not one patient gave any symptoms referable to the presence of venous thrombosis in the lower extremity. As a rule, some effort motion discharged the fatal pulmonary embolus; in 1 case it was manipulative reduction in the operating room; in another, transfer of the patient from a bed to a wheel chair; in others, turning the patient from one side to the other in bed. Deaths occurred as early as the sixth day and as late as the seventieth day following injury.

The occurrence of venous thrombosis and embolism is less frequent in patients who are made ambulant early, and prophylactic bilateral superficial femoral vein ligation combined with lumbar sympathetic block is suggested as being most ideal for the prevention of pulmonary embolism in fractures of the hip, especially in those who cannot be made ambulant early. STEPHEN A. ZIEMAN, M.D.

Gaston, E. A., and Folson, H.: Ligation of the Inferior Vena Cava for the Prevention of Pulmonary Embolism. *N. England J. M.*, 1945, 233: 229.

The literature on vein ligation for the prevention of pulmonary embolism is reviewed. Femoral vein and common iliac vein ligations are discussed. Ligation of the inferior vena cava seems desirable, first to interrupt the venous channel above the evi-

dent femoroiliac thrombosis, and second to prevent embolism from a simultaneous, subclinical phlebothrombosis that is frequently present in the veins of the opposite lower leg.

Although it seems evident in a great majority of cases that pulmonary embolism arises from venous thrombosis originating in the vein of the lower legs and later progressing upward to involve the pelvic veins, there are some cases in which the thrombotic process arises in the pelvic veins themselves.

Numerous reports of experimental rapid occlusion of the inferior vena cava by ligation have been published, beginning with the work of Lower in 1669. It has been repeatedly and conclusively shown that ligation above the level of the renal veins results in death, usually with accompanying anuria and uremia. Below the level of the renal veins, experimental ligation of the inferior vena cava is compatible with life, carries a low mortality rate, and is associated with only slight and transient edema of the lower extremities.

The authors have reviewed clinical reports of inferior vena cava ligation in man and state that ligation of the inferior vena cava below the level of the renal veins, although an operation of considerable magnitude, is compatible with survival in both experimental animals and man.

Two cases are presented to illustrate situations in which an operation was followed by recovery. At the time of caval ligation both patients had suffered multiple pulmonary infarcts. Both had had previous common femoral vein ligation, bilateral in the first case and on one side only in the second case. Caval vein ligation was performed under spinal anesthesia, supplemented by sodium pentothal in one case, through a right rectus incision. The inferior vena cava was ligated in continuity with two nonabsorbable sutures 1 cm. apart, at the level of the bifurcation of the aorta.

Mottled cyanosis of both legs was noted immediately after operation followed by pitting edema, which came on in 4 hours. However, there was gradual subsidence of this, and 4 months after operation there was no edema in the first case and only minimal edema of the left leg in the second case.

The following points are considered most helpful in sustaining the patient through the critical postoperative period: swathing the feet, legs, and thighs tightly in elastic bandages to help prevent shock due to the rapid withdrawal of edema fluid from the circulation; the early use of oxygen; and adequate intravenous infusions of plasma and whole blood.

LUCIAN J. FRONDUTI, M.D.

BLOOD; TRANSFUSION

Britton, C. J. C., and Warner, C. P.: Leucemoid Blood Reaction Simulating Acute Aleucemic Leucemia in a Case of Phlegmonous Gastritis. *Lancet*, Lond., 1945, 249: 430.

A case is reported wherein apparently the blood picture reaction to a phlegmonous gastritis so closely resembled that of an acute aleucemic myeloblastic leucemia that the correct diagnosis was not made during life. The patient was a single woman aged 47 who developed a sore throat, cold, and temperature. After five days of treatment with a sulfonamide (identity and dosage unknown) she vomited. This illness was followed by weakness and an apyrexial symptomless period of about 10 days; then the patient developed a high temperature, headache, and a slight cough, drowsiness, slow cerebration, pale mucous membranes, and heavily coated tongue. The liver was palpable 1½ inches below the costal margin, and soft glands could be felt in the posterior triangle of the neck and in the groin. At this time the blood picture exhibited a total white count of 3,700 with a paucity of polymorphs (5.5 %), and a large number of myeloblasts or promonocytes (45.0 %). The lymphocytes amounted to 35.5 per cent; there was only one normoblast but numerous platelets were found. Ten days later the blood picture showed a white count of 2,600, 4 per cent of polymorphs, 17 per cent of myeloblasts and 77 per cent of lymphocytes; and 8 days later the picture was that of a leucopenia with 1,400 white cells, with 8 per cent of polymorphs, 50 per cent of myeloblasts, and 40 per cent of lymphocytes.

The patient did not at any time show material improvement in her condition; under the picture of an anemia, hyperpyrexia, weakness, and mental confusion, she died a month after the onset of the illness.

Autopsy showed no evidence of leucemia in any organ. In the bone marrow there was a moderate increase in the erythroblastic and myeloid tissue, but no myeloblastic reaction was noted. The most striking finding was an acute phlegmonous gastritis with ulceration and gangrene; low grade peritonitis and bronchopneumonia were also present.

Since the clinical findings all pointed to a diagnosis of acute aleucemic leucemia, and the patient was obviously dying when she came under the authors' attention, confirmation of the diagnosis by means of sternal puncture was not considered necessary, and therefore the autopsy findings were a complete surprise.

JOHN W. BRENNAN, M.D.

Thiersch, J. B.: Attempted Transmission of Human Leucemia in Man. *J. Lab. Clin. M.*, 1945, 30: 866.

Whereas in fowls and mice, leucemia can readily be transmitted in susceptible strains and only a minimal amount (one leucemic cell) of leucemic material is necessary for a successful transmission, all attempts of previous workers and the ones described herewith to transmit this condition in man have failed. So far no transmission of leucemia from man to man, by means of blood, lymph nodule, or spleen, has been established. The reason for this failure might be sought in the following factors:

The technique employed. The assumed leucemic agent might not be able to contact sufficient susceptible cells of its own type, that is, cells of the bone

marrow or lymph nodules, by the subcutaneous or intravenous routes, which were employed for the attempted transmissions. The agent of human leucemia might be extremely sensitive and not survive the procedure of transmission.

The material used. Whole blood, lymph nodules, and spleen might not be suitable for transmission in that they might either contain no leucemic agent or have it only in an inactive form.

The time of observation. The time of observation in many cases was certainly very short, but even 27 months might not be sufficient time for the agent to establish itself and produce a leucemia.

The choice of hosts. As only people with a life prospect of under two years were available and all suffered from incurable diseases, the recipients could not be regarded as "virginal organisms." These patients might have had sufficient antibodies to prevent a take.

The recipient might also have had a natural immunity, might have belonged to a nonsusceptible strain of man, or might have had an acquired immunity which protected him against any leucemic agent.

It also might be that human leucemia, contrary to animal leucemia, cannot be transmitted and therefore all attempts at transmission were useless from the start.

The fact that even material from acute leucemias would not produce reactions in the recipients is remarkable as one would expect that this type of leucemia with its fulminant course would be the easiest to transmit.

Of all the factors mentioned, the difficulty of obtaining suitable hosts and the apparently unsuitable routes were the most important and might certainly have been responsible for the negative results of the transmission attempts. BENJAMIN GOLDMAN, M.D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Fomon, S., Luongo, R., Schattner, A., and Turchik, F.: Cancellous Bone Transplants for the Correction of Saddle Nose. *Ann. Otol. Rhinol.*, 1945, 59: 518.

An ideal nasal transplant should be readily available in sufficient quantity and have a consistency that will permit easy modeling. It must resist infection and absorption, be well tolerated by the tissues, and not subject to change in shape after implantation. While a graft meeting all of these specifications is still being sought, the authors believe that at present cancellous bone obtained from the ilium is the material of choice. Next to cancellous bone, cartilage is probably the most satisfactory material for nasal grafts, but it has certain undesirable qualities not encountered in grafts of cancellous bone. It is prone to curl and its failure to form an organic union with the nasal bones, to which it becomes united only by means of fibrous tissue, frequently leads to an unnatural mobility.

In preparing for the operation a cast is made of the nasal defect and from this a stent is built up to the normal contour. This model is sterilized at the time of operation to aid in the shaping of the transplant. The first step in the operation is the preparation of the bed which is to receive the transplant. A circumferential incision is made in the left vestibule along the lower lateral cartilage and through this the soft tissues are separated from the dorsum of the nose. At the upper end the periosteum is undermined for the reception and immobilization of the tapered end of the proposed transplant. If a columellar strut is needed, an incision is made along one side of the membranous septum and through this a bed is made in the columella between the two mesial crura.

The surgeon and assistants then change gown and gloves, and freshly sterilized instruments are supplied to prevent cross-contamination as the transplant is obtained. The iliac crest is exposed through a curved incision, and the periosteum and a thin layer of cortical bone are then resected from the crest with a chisel and mallet. A piece of cancellous bone of appropriate size is then removed. To prevent splintering, the graft is undercut with a thin, broad chisel, first on one side and then on the other, in an oblique manner so that the cuts will meet beneath the center of the graft at the required depth. No attempt should be made to elevate the graft until it lies free in its bed. A motor driven saw is not recommended in this procedure because it is believed that the heat which it engenders tends to impair the viability of the bone.

The graft is then shaped in accordance with the pattern made from the cast. The upper end is tapered to a thickness of from 1 to 2 mm., so that it will fit easily into the periosteal socket at the nasal root. The lower end is tapered to blend with the tip. It is then inserted into the prepared bed. Any blanching of the skin over the graft indicates too great tension upon the surrounding soft parts, and under such circumstances either the graft must be removed and made smaller, or the soft tissues must be undercut sufficiently to assure tensionless reception of the transplant. The incision is closed with atraumatic sutures and the nose loosely packed with vaseline gauze. The graft is held in position externally by narrow strips of adhesive tape applied around the tip and over the bony dorsum. To protect the nose against trauma and minimize postoperative edema, a stent dressing is firmly applied and held in place with adhesive strips.

The authors have used cancellous bone for nasal grafts during the past three years and have found it far superior to other material used for this purpose.

JOSEPH J. MCDONALD, M.D.

Bailey, O. T., Ingraham, F. D., Swenson, O., Lowrey, J. J., and Bering, E. A.: Human Fibrin Foam with Thrombin as a Hemostatic Agent in General Surgery. *Surgery*, 1945, 18: 347.

This article records the findings and results of carefully planned experimental and clinical investigations, and the conclusions reached are based upon controlled pathological and clinical observations in a sufficient material.

In 5 monkeys, lacerated wounds of the liver were packed with fibrin foam with thrombin; the wounds were sutured, and examined at intervals of 30 minutes, 4 hours, and 21, 70, and 74 days.

In 4 monkeys a 1 cm. cube of fibrin foam soaked in human thrombin solution was inserted deep in a stab wound of the liver. The wounds were sutured and examined after an interval of 11 and 16 days, and 8½ and 12 weeks. This procedure was repeated with the variation that sulfadiazine was used in conjunction with the hemostatic materials, and the specimens were examined 8 days, and 5½, 8, 9, and 12 weeks later. In another monkey this procedure was repeated except that a cube of fibrin foam with thrombin that had been dipped in penicillin was placed in a second stab wound. This animal was sacrificed 34 days after the operation.

In 5 monkeys a cube of fibrin foam with thrombin was placed between the traumatized liver and the diaphragm, and the animals were given an autopsy examination at 3 (2 animals), 4½, 8, and 12 weeks. This procedure was repeated with the variation that the fibrin foam, after soaking in thrombin, was rolled in sulfadiazine powder and the autopsies were done at 5½, 8 (2 animals), 8½, and 12 weeks.

In 3 monkeys, which were sacrificed 3, 7, and 14 days, respectively, after operation, two stab wounds

were made in the liver; a cube of fibrin foam soaked with thrombin was implanted in one wound, and a piece of the monkey's rectus muscle in the other wound.

In 2 monkeys a square of fibrin film (2 cm.) was sutured, over a cube of fibrin foam with thrombin, to the diaphragmatic surface of the liver. These animals were sacrificed 107 and 154 days after the operation.

To observe reactions in the peritoneal cavity 10 monkeys were utilized. In 5 animals fibrin foam with thrombin was placed in the pelvis, and in the other 5 the hemostatic material and sulfadiazine was used. These animals were sacrificed between 5 and 12 weeks after the operation.

In 3 guinea pigs cubes of fibrin foam with thrombin were placed in abdominal wounds, and the animals sacrificed 3, 7, and 14 days after operation.

In 2 monkeys fibrin foam with thrombin was placed upon the resected pole of the kidney and the renal capsule sutured over. One animal died 21 days after the operation, from a perirenal abscess, and the other was sacrificed on the sixty-fifth postoperative day.

In 4 monkeys and 1 cat the kidney was divided sagittally to the renal pelvis and the bleeding surfaces were covered with fibrin foam with thrombin. Since the hemostatic stopped the bleeding, sutures were placed in the renal capsule only. The monkeys were sacrificed 3, 7, 10, and 14 days, and the cat 322 days after the operation.

In 5 monkeys and 1 cat a cubelike piece of fibrin foam with thrombin was implanted in an incised wound in the pulmonary parenchyma and the wound closed by sutures. One monkey died 5 minutes after the operation; the others were sacrificed 7, 10, 14, and 24 days, and the cat 356 days, after the operation.

For each of the experiments the authors report the pathological findings and results. These may be summarized by quoting from their comment as follows:

"These studies have shown that fibrin foam with thrombin is an effective hemostatic agent in the liver, peritoneal cavity, abdominal wall, kidney, and lung of experimental animals. Only a slight tissue reaction is elicited and, in the end-result, the amount of fibrous tissue due to the presence of the fibrin foam with thrombin is so small that it cannot be regarded as clinically significant even when a large mass of fibrin foam with thrombin is used. The fibrin foam with thrombin is completely absorbed in about 5 weeks and sometimes at a shorter interval after implantation. The tissue reaction is not altered by the use of sulfadiazine or penicillin at the same time. The use of fibrin film and fibrin foam with thrombin does not alter the tissue reaction and final results to either.

"Fibrin foam with thrombin elicited very much less tissue reaction than muscle fragments of the same size. The tissue reaction to soluble cellulose with thrombin and fibrin foam with thrombin are about the same qualitatively and quantitatively."

These findings "emphasize the safety of fibrin foam with thrombin for they indicate that a large mass of fibrin foam with thrombin leaves less reaction than a group of cotton fibers so small and so few as to be overlooked by the surgeon."

On the basis of this experimental work, fibrin foam with thrombin was recommended for clinical use in general surgery. Reports of its use in 240 patients in various operations have been accumulated.

Fibrin foam with thrombin has been found to be a useful hemostatic in the bed of the gall bladder, and cut surfaces of the liver; after the taking of biopsies or resections of tumors, resections of mixed tumors of the parotid gland, the removal of portions of retroperitoneal and large pelvic tumors, biopsies of the pancreas and spleen, and colporrhaphy and hysterectomy; in the bed of the prostate, in controlling the bleeding from divided pleural adhesions, and in the beds of mediastinal tumors, as well as in the ends of bones and in the soft tissues at sites of amputations. Fibrin foam with thrombin was also found to be an effective hemostatic agent in 6 cases of hemophilia and in patients whose prothrombin time was elevated.

The authors point out that the thrombin is the active hemostatic agent while the fibrin foam is a matrix to hold it. They further emphasize that when large amounts of thrombin are required and the absorption of the material holding the thrombin is unimportant, thrombin-soaked gauze may be preferable to fibrin foam with thrombin.

In their summary the authors state:

"The use of fibrin foam with thrombin should not replace the careful control of bleeding by means of meticulous dissection and adequate placing of sutures. It should be reserved for those particular situations in which an absorbable hemostatic agent is desirable to prevent the injuring of vital anatomic structures or to control oozing which is not easily stopped by conventional methods, as in the beds of tumors and the cut surface of parenchymatous organs."

DAVID H. LYNN, M.D.

Loewe, L., Rosenblatt, P., Russell, M., and Alture-Werber, E.: The Superiority of the Continuous Intravenous Drip for the Maintenance of Effectual Serum Levels of Penicillin; Comparative Studies with Particular Reference to Fractional and Continuous Intramuscular Administration. *J. Lab. Clin. M.*, 1945, 30: 730.

When the sensitivity of an infecting organism is known, it is a simple matter to choose the proper dosage for fractional intramuscular treatment. Most strains of beta hemolytic streptococci are highly susceptible to penicillin, and are inhibited in vitro in concentrations of from 0.008 to 0.015 unit per cubic centimeter. Dosages of between 20,000 and 25,000 units of penicillin, administered every 2 hours, satisfactorily inhibit this type of organism. The relatively resistant organisms, such as the alpha and gamma streptococci, however, may have a penicillin sensitivity of from 0.15 to 0.6 unit per

cubic centimeter, or higher. With intramuscular dosage, the 2-hour penicillin level is almost always below the in vitro sensitivity of the organism. Thus, therapy may be ineffectual for a significant portion of the time between injections. Besides, many patients do not tolerate fractional intramuscular injections. The necessity for frequently repeated injections will also interfere with the rest of the patient.

The authors believe, therefore, that the fractional intramuscular method of penicillin administration can be recommended in the treatment of disease due to bacteria which are highly susceptible to the action of penicillin, and when the span of the treatment is relatively short, as it is in gonorrhea and pneumonia.

The method of continuous intramuscular infusion is technically simple. Its maintenance causes serious complaint from the patient. The thigh muscles of the average patient were found to tolerate only 750 c.c. of solution per day. More than this resulted in acute muscular soreness and necessitated discontinuance of the infusion. Besides, in the same patient, under identical experimental conditions, serum penicillin concentrations following the continuous intramuscular drip tended to be consistently lower than those obtained by the continuous intravenous drip.

The method of continuous intravenous drip is technically more difficult than fractional or continuous intramuscular dosage. The use of 23-gauge needles and the utilization of veins about the wrist, forearm, and legs overcome many of the difficulties. This method causes minimum discomfort and is well tolerated.

The incorporation of heparin in the venoclysis is believed of value in continuous intravenous therapy. It is possible to keep the drip at a single site for 14 days. It is, however, preferable to change the site every 3 or 4 days. The high serum levels thus obtained make it possible to attack infections hitherto considered inaccessible to penicillin therapy. Extreme resistance of an infecting agent should no longer be a deterrent to attempts at penicillin treatment. Massive dosage, even up to 10,000,000 units per day, does not produce symptoms of toxicity.

SAMUEL KAHN, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Harvey, E. N., Butler, E. G., McMillen, J. H., and Puckett, W. O.: Mechanism of Wounding. *War Med.*, Chic., 1945, 8: 91.

High velocity missiles have been observed by means of high speed moving pictures (from 2,000 to 7,000 frames a second) showing the movement of the missile in water and gelatin gel. Roentgenograms taken with a one-millionth second exposure demonstrate that similar changes occur in living tissues of anesthetized dogs and cats. This investigation exhibits shock waves in tissues, the formation of a very large temporary cavity which pulsates several times before subsiding, a region of extravasated blood, and a permanent cavity larger than the cross sectional area of a missile.

In general, it can be stated that the effect of penetration of a high velocity missile is analogous to that of a little explosion within the tissue.

The article is accompanied by 17 figures showing the successive steps of the penetration of a missile, and microsecond roentgenograms of missiles passing through tissues and substances.

RICHARD J. BENNETT, JR., M.D.

Young, M. W.: Mechanics of Blast Injuries. *War Med.*, Chic., 1945, 8: 73.

During the present war some antipersonnel mines and concussion bombs were preceded by pilot bombs, screeches, noise makers, buzzes, or even sirens, and these were apparently designed to produce a reflex contraction of the voluntary muscles of the body; and this, in turn, produced an initial increase in venous and cerebrospinal fluid pressure. Voluntary muscle contraction will produce an increase in venous pressure. An increase in venous pressure is transmitted to the cerebrospinal fluid. When an actual bomb explosion follows the preliminary noise, the preliminary sounds could serve as a warning for persons nearby to voluntarily contract all their muscles, thus raising the venous pressure; when the actual explosion occurs this increased venous pressure is again greatly increased by the sudden explosion which causes a wave of increased atmospheric pressure. This concussion wave causes a sudden increase of atmospheric pressure surrounding the body, and it produces an increased pressure on the body and its fluids. Sailors undergo a similar experience when caught by the water concussion wave of a depth charge. When applied to the body, this increased pressure may be as much as several atmospheres. The pressure on all the body surfaces and fluids is increased except within the craniovertebral space, which is protected from external forces by a firm bony globe. The pressure within the cranium at the instant of increased atmospheric pressure is for an instant the lowest in the body. The blood from other areas is literally squeezed into this low pressure area in the cranium. The cranium becomes quickly filled with fluid and then experiences the maximum force of the external pressure.

Experiments were carried out in which preliminary ligations of the jugular veins were done, and the sudden external pressure was applied. It was demonstrated that preliminary ligation of the jugular veins will almost completely prevent the increase in intracranial pressure. From the practical standpoint, when preliminary noises give warning of an impending explosion, it would be to the individual's advantage to be taught to compress his jugular vein rather than cover his ears; by so doing he is able to protect his nervous system from the greater compression soon to follow.

RICHARD J. BENNETT, JR., M.D.

Padgett, E. C., and Gaskins, J. H.: The Use of Skin Flaps in the Repair of Scarred or Ulcerative Defects over Bone and Tendons. *Surgery*, 1945, 18: 287.

The results and conclusions cited in this article are based upon a series of 97 patients operated upon during a 15 year period for the purpose of correcting chronic ulcerative lesions or deep adherent scars. The majority of lesions were on the extremities.

In selecting the optimum method for coverage of such defects one has to balance the utility of a skin graft against that of a skin flap. Each has certain advantages. A skin graft can usually be placed in one operation, while a skin flap will take at least two operative procedures. A skin graft has about normal thickness and gets its nerve supply quicker than a skin flap, which is often rather thick in appearance. In general, a skin flap has the advantages of a fairly high resistance to infection, some thickness for the purpose of filling a defect, it slightly lengthens an amputated extremity, and it covers a thumb or finger reconstructed by means of a bone graft with subcutaneous tissue. It can be used to cover exposed tendons, nerves, and bones, and certain bases with deficient blood supply, such as irradiation ulcers and sloughs. For the building of organs requiring thickness, for building a part requiring two soft pliable epithelial surfaces and some thickness—such as the nose, the cheek, and the lip—and as a direct covering for bone or cartilage, the pedicled skin flap has little competition.

It is emphasized that often a skin flap can be transplanted to the opposite leg, ankle, or foot with safety, and the resultant aseptic denuded base from which the flap was removed covered by a skin graft at the first operation, which saves time and a considerable number of operations.

In 5 of the 97 cases treated by the authors, flaps were used to cover skull defects; sliding or rotation flaps of the scalp were transferred successfully in one stage. In 27 cases flaps were transferred to the fingers, hand, or arm; the majority were made from the abdomen and were transplanted in two stages. Of these, 3 did not hold, 2 failures occurring in small children from whom it was difficult to obtain the needed co-operation. Body flaps were used in 3 cases to cover x-ray burns, one of the sacrum, one of the groin, lower abdomen, and upper thigh, and one over the lower abdomen. Partial sloughing of the flaps occurred in 1 of these cases.

In the cases in which the flaps were applied to the lower extremity, the majority of the lesions were due to trauma. In 13 cases thigh flaps were used. One of these, a reversed tubal pedicled flap, did not take because of necrosis of the distal end. In 45 of 49 cases leg flaps were used. In only 3 of these was the "take" delayed—1 flap was entirely lost and 1 was partially lost. In the latter case the flap was reapplied and a successful result was obtained. In 5 other cases there was a partial, but not significant, loss.

In 4 cases with a long defect over the anterior tibial bone a bipedicled lateral flap was raised after a relaxing incision was made posteriorly, the flap being brought forward and sutured to the opposite skin and subcutaneous tissue. In only 1 of these cases was the result entirely satisfactory. One wound became infected and 2 had partial central loss of the flap which required transfer of another flap from the opposite calf.

JOSEPH J. MCDONALD, M.D.

Patterson, T. C., Keating, C., and Clegg, H. W.: Experiences in the Prophylaxis and Treatment of Clostridial Infections in Casualties from the Invasion of Europe. *Brit. J. Surg.*, 1945, 33: 74.

The authors report 16 proved cases of anaerobic infection which were treated by local excision of any gangrenous muscle, as fully as circumstances would permit, or, if no alternative remained, by amputation. The wounds were irrigated freely with a warm hydrogen peroxide solution to remove the debris, and lightly dried, after which they were insufflated with a "frost" of sulfathiazole and 1 per cent neutral proflavine. This irrigation and frosting, used once or twice, frequently produced a wound so clean surgically that an early secondary suture was possible.

Sulfathiazole was the drug of choice. In the majority of cases a dose of 2 gm. was given, followed by 1 gm. every 4 hours.

Anti gas gangrene serum was also used in most of the cases. The normal procedure was to give from 15 to 30 c.c. diluted with equal parts of saline solution, intravenously, and to supplement this with 15 c.c. intramuscularly. The dosage was repeated every 6 hours until it was considered that the toxemia had been eliminated and the wounds were well on their way to being healed. Each cubic centimeter of the solution contained 4,500 units. The largest dose was 400 c.c.

Penicillin was used prophylactically in 8 cases and it was concluded that penicillin could not be guaranteed to prevent the development of anaerobic cellulitis. It was used intramuscularly as an aid to treatment in 9 cases—15,000 units being administered every 3 hours.

There was 1 death from bronchopneumonia after the anaerobic infection had subsided. Amputations were performed of 3 arms and 3 legs.

In summary, the authors conclude that adequate surgery is still the keynote of prophylaxis and treatment of gas gangrene. The most useful aids to surgery at present are anti gas gangrene serum in combination with sulfathiazole. The place of penicillin in the prophylaxis and treatment of gas gangrene is not proved and must remain uncertain until further investigations have been carried out.

LUCIAN J. FRONDUTI, M.D.

Gledhill, W. C.: Gas Gangrene. Thirty-Three Cases, with 1 Death, Treated at a Forward General Hospital in Italy. *Lancet*, Lond., 1945, 249: 264.

Clostridial infections of war wounds became more common as the battle scene moved from Africa to

the European theater. Heretofore most reports have dealt with cases seen chiefly at the forward casualty clearing stations and the field surgical units level and have shown fatality rates of from 30 to 60 per cent.

The 33 cases reported here were treated at a forward general hospital in Italy and there was but 1 death, which occurred long after the clostridial infection had been controlled. Most of the infections were recognized in from 4 to 5 days after wounding, and may have been less fulminating and severe than the previously reported cases; however, at least 10 of the cases were fulminating so that some other explanation of the low mortality must be sought. Although ample supplies of penicillin were available, it was not considered justifiable to depend on this drug alone. Full use was made of blood, gas gangrene antiserum, and sulfonamides.

The diagnosis of gas gangrene is essentially clinical. In general the most reliable signs of clostridial infection were: pain or heaviness in a limb; a rising pulse rate with moderate pyrexia; curious mental alertness; icteric tinge of the facies with circumoral pallor; low blood pressure; the characteristic odor; and the lifeless appearance of the muscles. Crepitus was not a prominent sign. Its presence is not a reliable guide to the extent of infection in the underlying muscles, for it is ordinarily found in the subcutaneous tissues well in advance of the muscle involvement. The importance of this fact is illustrated by 2 cases in which crepitus could be elicited up to the abdominal wall, and yet it was possible to amputate successfully through the middle or upper thigh.

Cases were classified as of 3 definite clinical types: gas abscess (6 cases); clostridial myositis (17 cases); and fulminating gas gangrene (10 cases).

The sheet anchor of treatment in fulminating gas gangrene is early surgical removal of the source of the toxemia. This usually means amputation in cases in which it is possible, or muscle excision on a large scale. The principle of efficient surgical excision must still be maintained, but experience with penicillin and the sulfonamides encourages the hope that a more conservative approach may be justified in the future. As experience with, and confidence in penicillin increased in this series, the approach became less radical, with the result that several limbs were saved. In addition to large amounts of blood and antiserum, the average parenteral dose of penicillin per case was from 300,000 to 500,000 units, given at 3-hourly intramuscular injections of 20,000 units. As the outcome is usually determined in from 24 to 72 hours, this will suffice. Most patients were given a course of from 25 to 30 gm. of sulfathiazole.

A very low mortality rate was achieved and the number of amputations (5) was low. Although, as a group, the cases were of less severity than those seen in forward areas, all the men were extremely ill on admission, and the 10 fulminating cases were comparable to those seen in the field surgical units. Penicillin used prophylactically, both locally and parenterally, did not prevent the onset of gas gangrene.

JOHN L. LINDQUIST, M.D.

Meleney, F. L., Friedman, S. T., and Harvey, H. D.: The Treatment of Progressive Bacteria. Synergistic Gangrene with Penicillin. *Surgery*, 1945, 18: 423.

Progressive bacterial synergistic gangrene, due to the associated presence of a microaerophilic nonhemolytic streptococcus and a hemolytic staphylococcus aureus is now accepted as a clinical entity. The authors report 3 cases of this malady that were treated with penicillin.

A patient, critically ill with pulmonary abscesses and empyema, failed to respond to sulfadiazine and was treated by resection of a rib and drainage. The typical lesion of progressive bacterial synergistic gangrene developed around the wound in the chest wall. The use of penicillin intramuscularly and intrapleurally resulted in healing of the gangrenous ulcer and cure of the patient.

In a second patient an enterostomy was done following resection of the gangrenous terminal loops of the ileum. Although sulfadiazine was used postoperatively, the patient developed the lesion of progressive bacterial synergistic gangrene around the enterostomy wound. The spreading infection was brought under control by the use of penicillin intravenously, and the lesion healed.

In a third case of multiple boils, a number of bacterial species including the microaerophilic nonhemolytic streptococcus and the staphylococcus aureus were isolated. In this patient "the lesions, while they had most of the characteristics of the progressive bacterial synergistic gangrene as described in previous reports, differed in three respects. In the first place, they were multiple; second, they were not excruciatingly painful; and third, the zone of gangrene was relatively narrow." These lesions responded unsatisfactorily to penicillin or to other forms of therapy and the patient died from a pulmonary embulus.

The sulfonamides have not been effective in controlling progressive bacterial synergistic gangrene, but penicillin offers real hope.

DAVID H. LYNN, M.D.

Brown, C. W., McClintock, L. A., and Neary, E. R.: Established Surgical Infections. Treatment with Urea-Sulfanilamide Mixture. *Am. J. Surg.*, 1945, 70: 4.

The topical use of sulfonamides alone in necrotic or purulent wounds is known to be of little or no therapeutic value. On the other hand, reports of experimental and clinical studies indicate that in the local treatment of grossly infected wounds urea-sulfonamide mixtures possess valuable antibacterial and related therapeutic properties.

The purpose of this investigation is to evaluate the urea-sulfanilamide mixture in the local treatment of established chronic surgical infections. The urea-sulfanilamide which was used was a crystalline mix-

ture consisting of 3 parts of urea and 1 part of sulfanilamide. This specific mixture was selected as most satisfactory on the basis of experimental and clinical observations. The crystalline components in the selected mixture, when generously applied to a wound, supplied the maximal percentage of relatively insoluble sulfanilamide which would not give rise to foreign-body reaction, and an excess of freely soluble urea sufficient to assure its prolonged action *in situ*.

It was supplied in sealed, resilient, plastic tubes, within which the crystalline drugs had been sterilized by a nontoxic, chemical process that does not adversely affect either the urea or sulfonamide crystals. Sixty hospitalized cases of serious—chiefly chronic—surgical infections were studied. They represented most of the usual variety of such infections seen in general hospital practice, and consisted of hematogenous and post-traumatic osteomyelitis, purulent and necrotic skin defects that required grafting, pulmonary abscess and thoracic empyema with external sinus tracts, and miscellaneous cases including infected postoperative wounds, trophic ulcers.

In addition, several cases of suppurative peritonitis were studied, particularly to determine the rate of absorption of sulfonamide from an infected serosal surface following the topical application of urea-sulfanilamide. In all cases in which the infected wound was external, the lesion was dressed once daily and the entire surface area of the wound was freely covered with insufflated urea-sulfanilamide. This required the daily application of from 3 to 20 gm. of the mixture per patient. In cases of draining lung abscess and empyema, from 10 to 30 gm. of urea-sulfanilamide per day were applied locally after insertion of the insufflating container into the short sinus tract. The more devious fistulous tracts were filled daily with the mixture by means of a soft rubber catheter attached to the insufflating container. Intraperitoneally, a single dose of from 10 to 20 gm. of urea-sulfanilamide was implanted at the time of operation.

Careful appraisal of a chemotherapeutic agent in surgical infections requires a plan of investigation that considers the many variable factors which may influence the results, including among other determining elements the duration, previous treatment, extent of tissue destruction, and bacterial population of such infections.

Frequent studies of the qualitative and quantitative bacterial population of all wounds provided a means of confirming clinical response to treatment with urea-sulfanilamide. Wound cultures were made at the start of treatment and, insofar as possible, every three to five days during treatment with the mixture. Specially prepared swabs, which absorbed approximately 0.1 c.c. of fluid, were used to obtain samples of wound exudates. From saline suspensions of these, aerobic and anaerobic cultures and colony counts were made on meat infusion agar with dextrose, and on solid thioglycollate agar, respectively. Cultures on blood agar and in tryptose phosphate broth were also routine. In addition, estimation in vitro of the antibacterial threshold concentrations of sulfanilamide for organisms isolated from certain wounds at the start of treatment helped to establish the degree of sulfonamide-resistance that these bacterial invaders manifested in failing to respond to earlier treatment with sulfonamide alone.

Periodic hemopoietic, blood chemistry and other pertinent laboratory studies were made in all cases. Clinical progress was charted and recorded in the usual way.

As urea-sulfanilamide comes in contact with a purulent exudate, it rapidly goes into solution. As long as the wound discharge is profuse, a dry sterile dressing is best used after insufflation of the mixture into the wound. Local edema rapidly subsides and the amount of wound exudate greatly decreases within a few days. At this point it has been found advisable to employ dressings soaked in saline solution instead of dry gauze dressings. Saline dressings prevent dryness and crusting of the nondischarging wound and do not impede local absorption of the mixture.

As wound edema subsides, it seems that early vascularization occurs and granulation progresses more rapidly than usual. When healthy granulations have appeared and wound discharge is scant, much smaller amounts of insufflated urea-sulfanilamide suffice and do not retard epithelization as larger quantities of the mixture are likely to do at this stage of treatment. In the pregrafting preparation of infected skin defects, however, generous quantities of urea-sulfanilamide may be topically applied up to the time of grafting.

In none of the cases studied, have any reactions occurred that could be construed as a manifestation of local or systemic toxicity to urea-sulfanilamide. No significantly abnormal findings, attributable to the use of the mixture, have been demonstrated in frequent hematological and urinary studies throughout treatment. BENJAMIN GOLDMAN, M.D.

Ory, E. M., Meads, M., and Finland, M.: Penicillin X. *J. Am. M. Ass.*, 1945, 129: 257.

Several forms of penicillin have been identified in cultures of penicillium notatum. Three of these, known as penicillin F, G, and X in this country, and as penicillin 1, 2, and 3 respectively, in Great Britain, have been isolated in crystalline form. Commercial penicillins prepared from deep vat cultures consist almost entirely of penicillin G, but those prepared from shallow surface cultures in flasks may contain appreciable amounts of penicillin X, varying up to 20 or 25 per cent.

When tested simultaneously with preparations containing 65 per cent or more of penicillin X and with commercial lots which consist almost entirely of penicillin G, most strains of group A hemolytic streptococcus, gonococcus, and meningococcus were from two to eight times more sensitive to penicillin X, most strains of pneumococcus and streptococcus

viridans were twice as sensitive to penicillin X, and most of the staphylococci were equally sensitive to the two kinds of penicillin.

Levels of penicillin activity in the serum against a strain of hemolytic streptococcus were significantly higher and sustained longer after intramuscular injections of penicillin X than after injections of the same number of units of regular penicillin.

The methods used both in determining the sensitivity of bacteria and in estimating the serum concentrations are admittedly crude. It is most unlikely, however, that the consistent differences between the commercial preparations and the lots of penicillin X observed in the authors' studies could be explained on the basis of such methods. The results obtained with the different lots of penicillin serves to emphasize the superiority of the penicillin X.

The findings suggest that comparable therapeutic results may be expected with the use of smaller doses or with the same doses given at longer intervals when penicillin X is used.

A preliminary clinical trial indicated that penicillin X is nontoxic and at least as effective as regular penicillin in the same doses in cases of pneumonia, and probably more effective in gonococcic infections. Further clinical trials with the use of smaller doses and longer intervals are necessary in order to establish the therapeutic superiority of penicillin X.

JOSEPH K. NARAT, M.D.

Hirsh, H. L., and Dowling, H. F.: Observations on the Continuous Intramuscular Method of Administering Penicillin. *Am. J. M. Sc.*, 1945, 210: 435.

Use of the constant intramuscular method of penicillin administration in 110 patients is reported, and the concentration in the blood of patients studied is compared with that achieved by other methods.

The amount of sodium penicillin required for 12 hours was usually dissolved in 1,000 c.c. of isotonic salt solution and allowed to flow at a constant rate of from 30 to 40 drops per minute into the lateral aspect of the thigh or into the gluteal muscles. When administered at the rate of 200,000 units in 24 hours the concentration of penicillin in the blood remained constant and at therapeutically effective levels 96 per cent of the time, whereas with the injection of 25,000 units every three hours similar concentration was obtained only 80 per cent of the time. The corresponding figures for the injection of 20,000 and 15,000 units every 2 hours were 67 and 63 per cent, respectively.

No deleterious effects or complications were observed except for mild to moderate pain or discomfort at the site of injection in 6 patients. Pain was usually prevented by changing the location of the needle every 24 to 96 hours. Prompt and complete relief of pain was obtained by the addition of procaine to the penicillin solution. This method avoids repeated painful intramuscular or intravenous injections, traumatization of the veins and phlebothrombosis. The patient has almost complete freedom of activity.

The authors believe the continuous intramuscular drip to be the method of choice in very ill patients who require continuously high blood concentrations of penicillin. WALTER H. NADLER, M.D.

Bailey, H.: The Treatment of Cervical Collar-Stud Abscesses with Skin Involvement. *Brit. J. Surg.*, 1945, 33: 53.

The author describes his experience with 200 cases of tuberculous collar-stud abscesses. Conservative management of these cases consisting of aspiration, incision, or incision and scraping is considered a pernicious practice. Wide open excision is recommended.

In about 25 per cent of the cases the superficial abscess does not overlie the broken down glands that feed it; indeed, the "factory" and the "storehouse" may be as much as 6 or 8 inches apart. If success is to attend the method of treatment, it is fundamental to remove not only the abscess but also the degenerating glands and the fistula which connects them.

A proper preoperative clinical examination of the whole neck will unmask the long stemmed collar-stud abscess, which is the one requiring special consideration.

The standard technique of treatment is as follows:

1. Excision of all unhealthy skin, including skin that at first sight appears healthy but on closer examination is found to be undermined and pathological on its under surface.

2. Complete dissection of relevant diseased lymphatic glands. When the sternomastoid interferes with their clear display, the muscle is divided and subsequently reunited.

3. Hemostasis being rendered as perfect as possible, the cavity is sprinkled with sulfanilamide powder and the hole filled with vaseline gauze; as it enters the wound, powder is poured on to the gauze, which is never allowed to touch the skin. The vaseline gauze must be of the right consistency; if it is too soft it tends to become displaced, and if too dry, it sticks to the granulations.

4. The cavity having been packed moderately firmly and filled completely, but not to overflowing, more sulfanilamide powder is sprinkled on to the surface and a piece of the tulle gras laid over the mouth of the wound so as to overlap its edges.

5. A viscopaste bandage is applied in such a way as to immobilize the neck. Formerly the author used a plaster cast. It is of great importance that the bandage is applied properly so that the patient, often a child, cannot displace it and expose any part of the wound.

The author stresses the fact that all diseased glands must be removed as otherwise a chronic sinus will develop. If during the intervals of repacking the bandage becomes disarranged and the wound becomes exposed, secondary infection is likely to occur.

Dressings should be changed every 7 days under absolute aseptic precautions; this should be done by a competent person. In making incisions the surgeon must take Langer's lines into consideration.

In describing the end-results the author states that large craters in the neck readily develop clean granulating surfaces and become epithelized without skin grafting. More often than not the resulting scars are not unsightly and are often linear.

LUCIAN J. FRONDUTI, M.D.

ANESTHESIA

Lundy, J. S., Adams, R. C., and Seldon, T. H.: Factors Influencing Trends in Anesthesia. *Surgery*, 1945, 18: 1.

At the Mayo Clinic the use of methods of anesthesia in the application of which special personnel is employed (for example, spinal and regional anesthesia that is administered by the professional anesthetist, intravenous anesthesia, intratracheal anesthesia, cyclopropane, curare, and so forth) has increased from 6.7 per cent in 1924 to 65.4 per cent in 1943. Tribromethyl alcohol as a rectal anesthetic has been more satisfactory than oil and ether by rectum. Barbiturates by rectum plus tribromethyl alcohol did not have any apparent advantage over tribromethyl alcohol alone. The use of acetylene was discontinued after 1930 because of the danger of explosion. Since 1937 intravenously administered pentothal sodium has been employed in about a third of the cases in which special methods of anesthesia were used.

The explosion hazard in the use of cyclopropane is well recognized and there have been reports of sudden collapse of patients at the end of long operations, as well as of fibrillation due to the drug. It would appear that, if one observes the recommended precautions in the use of cyclopropane, it is a widely useful agent but it is not an essential one, except in a limited field, particularly thoracic surgery.

The use of Magill's intratracheal tube has greatly enhanced the value of the inhalation anesthetic agents.

For the last eight years there has been little change in the percentage of employment of the agents used at present.

Barach, A. L., and Rovenstine, E. A.: The Hazard of Anoxia during Nitrous Oxide Anesthesia. *Anesthesiology*, 1945, 6: 449.

The morbidity and mortality following the use of nitrous oxide for surgical anesthesia have increased despite the refinements of administration and the more modern techniques. "The safest of all anesthetic agents" used in 1900 has become one of the most, if not the most, dangerous one today. Its strongest endorsement has been its lack of toxic reaction for any tissue, its noninflammability and its lack of discomfort for the patient through its rapid, pleasant induction and emergence. Its single serious imperfection is its lack of potency. In order to fulfill the requirements of surgical anesthesia in a patient who has not received previous depressant drug medication, some degree of anoxia must be an accompaniment. Previous reports from other workers have demonstrated that patients anesthetized with nitrous oxide will always suffer from a severe degree of anoxia. When the percentage of oxygen in the inspired gases is below 13.7 per cent, the arterial oxygen tensions were in the range of extreme asphyxia, 30 mm. of mercury.

The extensive studies of Courville and other research workers have shown that serious as well as fatal results may follow nitrous oxide oxygen anethesia, even though it is administered without gross error and by accepted techniques. Examples are given of patients who had died suddenly during anesthesia with nitrous oxide or who had delayed exodus after the agent was used. Another group of cases was discussed, in which recovery occurred but residual mental symptoms indicated cortical damage of the nervous system. A final group included patients who had transient mental and emotional manifestations but apparently recovered completely. There is essential agreement with Courville's work that such lesions most often include sclerosis, scattered pyramidal nerve cells, patchy necrosis, degeneration of various cortical layers, subtotal destruction of limited portions of the cortex, and similar lesions in the lenticular nucleus. It seems possible, from Barach's work and others, that permanent damage in the frontal lobe cortex as well as in other areas of the brain may take place with little obvious personality change, although subtle disturbances in emotional response may have been produced. Next to the brain the heart is the organ most sensitive to anoxia. This may be manifested by acute coronary insufficiency without the warning signal of pectoral pain.

The authors propose the dispensing of cylinders containing 80 per cent nitrous oxide and 20 per cent oxygen to avoid the possibility of anoxia during nitrous oxide administration. Each cylinder could be filled with 150 gallons of the mixture at 700 lbs. pressure to permit a uniform emergence of the 20/80 per cent gas mixture. The authors have warned against the so-called "gas oxygen anesthesia" which deliberately exposes the patient to severe anoxia, the result of which may be psychotic invalidism, personality defects, or death from circulatory or respiratory failure. MARY KARP, M.D.

Masson, G. M. C., and Beland, E.: Influence of the Liver and Kidney on the Duration of Anesthesia Produced by Barbiturates. *Anesthesiology*, 1945, 6: 483.

The object of the authors was to study the barbiturates by means of partially hepatectomized or completely nephrectomized animals, and to see whether or not a relationship existed between the duration of action of these compounds and the site of their detoxification. The past work done by other experimentors was brought up to date with numer-

ous references. The method of procedures was described in detail.

Twenty-nine barbituric compounds were studied and the results tabulated in such a manner as to suggest a new classification of the barbiturates according to the site of their detoxification. "The index of detoxification" was represented as the average duration of anesthesia of control animals as compared with average duration of anesthesia of experimental animals. This index figure was determined for each compound in the partially hepatectomized and the completely nephrectomized animals.

The authors suggested that group 1 contain those barbiturates detoxified mainly in the kidney—barbital and phenobarbital; group 2 contain those barbiturates detoxified mainly in the liver—ipral, amatol, nembutal, ortal, alurate, nostal, seconal, allyl-pental, evipal, and thioethamyl; group 3 contain those barbiturates detoxified approximately equally in the liver and kidney—neonal, delvinal, phanodorn, and dial; and group 4 those barbiturates possibly detoxified in all the tissues of the body, but not to any great extent in the liver or kidneys—pentothal, propyl 1-methylallyl, and allyl 1-methyl-allyl thiobarbiturates. MARY KARP, M.D.

Robin, P. A., and Collins, V. J.: Roentgenological Study of the Male Sacrum As an Aid in Caudal Analgesia. *Anesthesiology*, 1945, 6: 505.

Fifty unselected cases were subjected to a preliminary roentgenological examination of the sacrum. Caudal analgesia was then carried out independently and analysis of the results made. The method of x-ray study was described in detail.

A routine anteroposterior view of the sacrum was obtained to determine the apex of the caudal canal and to measure the transverse diameter of the caudal canal hiatus at the level of the 4th sacral segment. Body section roentgenography was used for the lateral view, and three or four planigraphic views were made close to the midline to obtain a more accurate delineation of the caudal canal. It was found that the apex of the caudal canal hiatus was situated at the 3rd sacral segment in 46 per cent of the cases, and below the 3rd sacral segment in 32 per cent. In 66 per cent of the cases the anteroposterior diameter was between 2 and 5 mm.; in 20 per cent it measured between 3 and 4 mm., and in 18 per cent it measured less than 2 mm. There was found to be a direct correlation between these findings and the ease with which the canal was entered. In 6 cases, or 12 per cent, no hiatus was apparent on the film, and it was believed a complete bony block of the opening of the caudal canal existed. Variation in size of the intertuberous diameter was not marked or significant. In 6 per cent of the cases no opening of the caudal canal was revealed on the anteroposterior films. This differed from the results as viewed on the lateral planigraphic films, but was explained by the lack of depth of the hiatus and the possible distortion of the film.

In 10 per cent of the cases small apertures were seen in the posterior wall of the caudal canal; in 14 per cent the cornua were flat or absent. A completely blocked lumen of the canal at the opening was noted in 10 per cent, and a partial block either at the opening or above was observed in 14 per cent of the cases. The sacrum appeared to deviate from the midline in 6 per cent of the cases and there was an exaggerated sacral curve in 16 per cent.

When observations were made on the patients after caudal anesthesia was attempted, it was found that 8 cases, or 16 per cent, were unsuccessful cases because of the inability to introduce the needle into the caudal canal. Most of these cases had roentgenographic findings that showed a complete block of the lumen or an absence of the lumen.

A method of x-ray study of the sacrum with special reference to the caudal canal was thus presented. The studies indicated the importance of preliminary roentgenological investigation prior to the attempt to produce caudal analgesia. The significant anatomical findings contributing to unsuccessful analgesia were a narrowed anteroposterior diameter, absence of the hiatus, a blocked lumen, and agenesis of the posterior wall of the caudal canal.

MARY KARP, M.D.

Newton, C. W., Jr., and Andros, G. J.: Continuous Caudal Analgesia in Curettage for Abortion. *Am. J. Obst.*, 1945, 50: 430.

In an attempt to decrease the blood loss at the time of therapeutic abortion and curettage for incomplete abortion, the authors have used continuous caudal analgesia as an anesthetic method. This technique maintains tonicity of the uterine muscle and at the same time provides analgesia of the perineum, vagina, and of the cervical and fundal portions of the uterus.

In 22 consecutive cases the average blood loss was less than 40 c.c. per patient, varying from less than 5 c.c. to 125 c.c. Seventeen of the patients lost 50 c.c. or less. There were no anesthetic, operative, or postoperative complications. Postoperative convalescence and return to normal activity of the patient is hastened. EDWARD L. CORNELL, M.D.

Roman-Vega, D. A., and Adriani, J.: The Efficiency of "Oenethyl" (2-Methyl-Amino-Heptane) As a Vasopressor Substance for Spinal Anesthesia. *South. M. J.*, 1945, 38: 635.

Because aliphate amines have never been employed for overcoming the hypotension of spinal anesthesia, the authors have been interested in determining the clinical value of such a compound for this purpose. This report comprises experiments with "oenethyl" in 700 surgical patients, with a preliminary report on the first 100 patients. 2 Methyl-amino-heptane, or "oenethyl," is a clear volatile liquid which is slightly soluble in water, and mildly alkaline. Its vasopressor action is similar to, but more sustained than that of epinephrine. It produces a rise in both systolic and diastolic pressure

and an increase in pulse pressure with improvement in heart action, dilatation of the pupils, pilorection, a bronchodilatory action, decrease in renal volume, and some stimulation of respiration, but no action on the smooth muscle of the uterus. Its pressor effect is due largely to constriction of the arterioles. Its toxicity is low and it does not appear to have any direct stimulating or depressing action upon the central nervous system. Large doses may cause weakness, lethargy, drowsiness, or prostration, and toxicity is manifested by hypotension and depression of the pulse rate.

Fifty-three per cent of the cases studied received "oenethyl" prophylactically to avoid anticipated hypotension. In the rest of the cases the drug was given therapeutically to combat hypotension when it appeared. The drug was administered intramuscularly or intravenously, the latter route being chosen when an acute hypotension occurred. The drug appeared to be an effective vasopressor which successfully combated the hypotension of spinal anesthesia in the majority of the patients to whom it was administered. In 5 per cent of the cases it failed to restore the blood pressure to the preoperative level. However, in no case did it fail to cause some elevation.

From 75 to 100 mgm. of the drug were found to be the therapeutic dose for intramuscular injection. When used intravenously, the effective dose varied from 10 to 50 mgm. and the best results were obtained by administering the drug slowly in divided doses of 10 mgm. each and allowing one-half minute to lapse between the administration of each fraction. Overdose caused an excessive rise in the blood pressure and a temporary disturbance in cardiac rhythm.

Venopressor studies on 6 subjects showed a restoration of pressure to preanesthetic levels. There was no significant alteration in pulse rate. Tachycardia was not observed at any time. Fifteen per cent of the patients demonstrated pupillary dilatation which persisted for approximately 30 minutes. Transitory dizziness was found in about 15 per cent of the cases, and nausea and emesis in 5 per cent. The onset of the pressor effects occurred in about 2 minutes when the drug was administered intravenously, and in from 3 to 5 minutes when it was given intramuscularly, and as a rule the effect was maximal within 10 minutes and was sustained for the duration of the operation following a single injection.

In 25 patients the drug was administered after ephedrine sulfate had failed to restore the blood pressure to satisfactory levels, and in all of these cases the blood pressure rose satisfactorily.

The authors concluded that "oenethyl" appeared to be a satisfactory vasopressor for spinal anesthesia and recommended its further clinical trial.

MARY KARP, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Krause, G. R.: The Roentgen Diagnosis of Pulmonary Infarcts. *Radiology*, 1945, 45: 107.

Roentgenologically, a pulmonary infarct may mimic any other lung disease and be interpreted incorrectly more often than any other pulmonary lesion. This may be due to its supposed rarity.

The author reviewed 344 cases of lung infarct which were seen at autopsy. The infarct was the direct cause or major contributory cause of death in 174 cases, and in only 22 per cent of that number was it diagnosed correctly. In 73 cases, clinical and roentgenological correlation with postmortem findings was adequate.

The literature reviews many positive roentgen findings of pulmonary infarct. Wharton and Pierson (1922) described clouding in the costophrenic angle as an early sign of infarct. Wessler and Jaches (1923) described the triangular shadow with the base toward the axilla. Smith (1938) described 6 signs of infarct: hazy, horizontal, clouding at the base, the suggestion of pleural effusion, increased circular density with cavity formation, dense linear shadow, and basal collapse of a lobe. Westermark (1938) described the area of avascularity in the region of the embolus. Jellen (1939) stated that an infarct may not be apparent for several days following the embolic process.

The majority of infarcts occur in cardiac and postoperative patients. Clinical findings of pulmonary infarct are: sudden, sharp, pleural pain and dyspnea; moderate elevation of the temperature and white blood count, with a gradual return to normal within a few days if the patient survives. Chilling is almost never present. The physical findings are: rales, change in breath sounds, and friction rub.

Most infarcts occur in the right lower lobe; they are frequently multiple and their average size is from 2 to 6 cm. The shape of the infarct tends to follow the lung contour and is not characteristic. Superimposition of infarcts may also cause a variation of the shape.

Complications of pulmonary infarct are secondary bronchopneumonia, pleural effusion, lung abscess, and pulmonopleural fistula. These complications obscure the detail and make the interpretation much more difficult.

Healing of infarcts does not occur by resolution. The necrotic tissue is replaced by fibrous tissue which results in scar formation and may be stellate or linear in type.

Infarcts must be differentiated from lobar pneumonia, bronchopneumonia, atypical pneumonia, tumors, passive hyperemia, pleural effusion, cysts and plaques of atelectasis.

In lobar pneumonia the pulmonary involvement is greater than that in the presence of an infarct. Within a 24- to 48-hour period, it may spread rapidly in spite of good clinical response to chemotherapy. In bronchopneumonia the involvement in the bases is multiple, patchy, and mottled. Atypical pneumonia resembles bronchopneumonia. Primary pulmonary tumors with resultant collapse of the lung can best be demonstrated by overexposed Bucky films. Passive hyperemia causes a dense bilateral linear shadow in the hilum radiating to the periphery with a gradual fading. Pleural effusion may be either free or encapsulated. Free fluid occurs in the lower lateral portion of the lung field with a smooth, curved upper border, and a convexity inferior. The superior border of an infarct in this area is straight with a convexity upward. Infarcts are never elliptical as in interlobar effusions. Air filled or fluid level cysts present no diagnostic difficulty; however, cysts filled with fluid do. These rarely occur against a pleural surface and are almost spherical in shape. Plaque or disk atelectasis may be difficult to distinguish from an early infarct. However, within a few hours the picture will have changed so that a diagnosis of atelectasis may be eliminated or confirmed. All infarcts leave scars and reach the pleural surface at some point; they may be multiple, are found at different planes, and are shorter than atelectatic plates.

Since pulmonary infarcts may mimic any other lung lesion it is essential to analyze the roentgen and clinical data carefully, for the welfare of the patient. If this is done, an accurate diagnosis of pulmonary infarct will be expedited, with prompt instillation of adequate therapy. MAURICE D. SACHS, M.D.

Thomas, S. F.: The Value of Gastric Pneumography in Roentgen Diagnosis. *Radiology*, 1945, 45: 128.

Although the importance of gastric pneumography localizing a mass in the body or tail of the pancreas has been stressed by previous writers, to date very little attention has been paid to this useful procedure as a means of localizing tumors in the upper abdomen.

For the purpose of distending the stomach the author modified the original technique of Engel and Lysholm by using a small calibered stomach tube instead of effervescent powders. The quantity of air injected varied from 300 to 800 c.c. The patient lies prone with high supports under the pelvis and chest. The x-ray beam is horizontal and a vertical Bucky diaphragm is used.

The normal retrogastric space is equal to the depth of the first or second lumbar vertebra. Caution must be exercised in removing all fluid and food contents from the stomach prior to the installations of air or diagnostic errors may ensue. Aside from pancreatic pathology, the retrogastric space may be increased by obesity, ascites, liver tumors, meta-

static nodes, retroperitoneal tumors, and invasion of the pancreas by perforated gastric ulcers. However, the author believes that when the pancreas is involved, the roentgen appearance is clean-cut.

A series of 38 cases were studied clinically by means of gastric pneumography and all of the cases were suggestive of pathology in the body or tail of the pancreas. As a result of this study, it is believed that gastric pneumograms are of definite supplementary value in the diagnosis and location of pathological enlargement in the body or tail of the pancreas.

MAURICE D. SACHS, M.D.

Pollard, H. M., and Cooper, R. R.: Hypertrophic Gastritis Simulating Gastric Carcinoma. *Gastroenterology*, 1945, 4: 453.

The symptoms of chronic hypertrophic gastritis are very much like those of gastric ulcer or gastric neurosis, or they are entirely absent. They characteristically appear from one to four hours after meals and consist of dull burning pain, distention, a sensation of pressure, and ructus. Vomiting, belching, and bland diets give relief. The only physical sign is occasional epigastric tenderness.

The importance of hypertrophic gastritis as a cause of gastrointestinal bleeding has been stressed repeatedly.

The gastroscopic appearance is diagnostic. The mucosa is deep red, boggy, has a diminished number of highlights, and looks abnormal between the rugal folds which are large. Moderate inflation does not affect the characteristic cobblestone resemblance and the pseudopolypoid changes.

There has been much controversy as to the value of barium meal in diagnosing hypertrophic gastritis. The authors observed 8 cases at the University Hospital of Ann Arbor during the past 4 years in which roentgen examination showed filling defects strongly suggestive of carcinoma. These cases are presented in brief résumés and the respective roentgenograms are used for the purpose of illustration.

All patients were males, their ages varying from 22 to 65 years. In all but 2 subsequent gastroscopy established the diagnosis of hypertrophic gastritis with reasonable certainty. This was confirmed in 7 of the 8 cases by laparotomy, and in 6 of the cases by histological examination of the removed tissue.

The following conclusions regarding hypertrophic gastritis are drawn: (1) when it is localized it is capable of producing a filling defect in the stomach which is difficult to distinguish roentgenographically from that of carcinoma; (2) its symptoms may be indefinite, and (3) neither roentgen nor gastroscopic examination is enough to make a differential diagnosis in the individual case.

T. LEUCUTIA, M.D.

Hemphill, J. E., and Reeves, R. J.: Roentgen Irradiation in the Treatment of Marie-Struempell Disease (Ankylosing Spondylarthritis). *Am. J. Roentg.*, 1945, 54: 282.

Marie-Struempell disease is a chronic progressive disease of unknown etiology. It is characterized by inflammation of the periarticular soft tissue of the joint with remissions and exacerbations of local and systemic manifestations.

Pertinent systemic manifestations are: progressive emaciation, secondary anemia, loss of weight, muscle atrophy, and accelerated pulse. Local findings are: migratory low back pain, stiffness, limitation of motion, muscle spasm, and, in the late stage, contracture, deformities, and fibrous and bony ankylosis. The clinical picture of Marie-Struempell disease is one with the patient flexed at the hips, flattened lumbar and exaggerated dorsal curves, and flat chest with limited expansion.

The early symptoms are: anorexia, nervousness, fever, and loss of weight. Back pain and stiffness (worse in the morning), may be radiating and are accentuated during fatigue and overexertion. Gradually the capacity for exertion decreases; there is limitation of motion of the spine and chest expansion. The sedimentation rate and white count are increased.

Roentgen findings in early stages of the disease may appear negative in the routine views; however, oblique views will show changes of the articular facets, especially those of the twelfth dorsal vertebra. Early changes consist of decalcification and irregular trabeculation in the subchondral bone next to the joint, with haziness and apparent widening of the joint space. Late changes show osteosclerosis of the subchondral bony margins with narrowing of the joint space and destruction of the articular cartilage, calcification of the ligaments with bridging, and eventual ankylosis of the spine. Of the group of 156 cases examined roentgenologically, 60 (40%) were in the early group, 58 (37%) were in the moderately advanced group, and 38 (23%) were in the advanced group.

One hundred and sixty cases of Marie-Struempell disease are reported; 137 (86%) of the patients were male and 23 (14%) were female; 151 (94%) were of the white race, and 9 (6%) were of the colored race. The ages of 123 (77%) ranged between 20 and 39. Three-fourths of the patients had symptoms for over one year.

Orthopedic treatment is given in conjunction with irradiation. Both forms of therapy are synergistic. Orthopedic treatment should be started as early as possible for relaxation of the muscles: gradual hyperextension and exercise to straighten the spine, with a high vitamin diet, physiotherapy, and education. Radiation therapy is given to the entire spine: 2 to 3 fields are treated daily with 150 r per field for a total dose of 600 r per field. Precautions should be taken when treating women. The course of therapy may be repeated in from 6 to 8 weeks.

The results of treatment showed that 108 patients (68%) were able to do more than before treatment and 13 bedridden patients (8%) were now able to do useful work. Follow-up results on 118 of the 160 patients treated revealed that 99 (60%) said they felt better and were able to work, and 19 complained of a recurrence of the pain and stiffness. Of the

treated patients, 20 per cent were symptom-free one year after therapy.

The authors emphasize that an early diagnosis and prompt orthopedic and x-ray therapy will yield the best results. MAURICE D. SACHS, M.D.

MISCELLANEOUS

Jolles, B.: The Causes and Prevention of Radiotherapeutic Edema of the Larynx. *Brit. J. Radiol.*, 1945, 18: 278.

The author correlates the available data which have an influence on the complex problems of edema of the larynx and draws certain conclusions as regards preventive or therapeutic measures.

Physiopathology. There are multiple factors upsetting the normal equilibrium between tissue spaces and the bloodstream, such as, (a) permeability of the membranes, (b) osmotic and diffuse potentials, (c) lymphatic and venous obstruction, and (d) organ activity, as, for example, edema surrounding the salivary glands. The last is of particular interest when the edema occurs in the neck undergoing radiation treatment. Other factors are (1) infection (leucotoxine), (2) predisposing factors, as plethoric hydremia, (3) millieu interieur, in which the acids resulting from a breaking down of inflammatory or neoplastic tissue lead to the production of edema; (4) sensory nerves and sympathetic local anesthesia which prevents or diminishes edema; (5) hormones, adrenalin-decreasing permeability, and acidification, and (6) decreased extravascular pressure.

Anatomy. The term "edema of the glottis" is a misnomer, since most of the edema occurs in the aryepiglottic folds. Weintraub, who made an extensive study of the connective tissues of the neck, describes—apart from the ordinary subcutaneous connective tissue—3 varieties of connective structures: (1) a membranous periorganism of laminar sheetlike connective tissue, which forms the adventitial covering of various organs and structures; (2) areolar, or shearing connective tissues, which form the anatomic or surgical spaces, and lie between moving parts; and (3) nerve-vessel carrying tissues which are intermediate in their physical consistency between the areolar and membranous varieties.

The second variety plays the most important role in edema of the neck.

Radiobiology. There is always a lag between the irradiation and the first biochemical and histological changes corresponding to the clinical latent period. The variations of ions in the blood of irradiated persons and their effect on edema are shown in Table I.

The many other factors which may influence the edema as the result of irradiation are grouped schematically in Table II.

Treatment of edema. As may be seen, a rather gloomy picture is obtained in regard to the chances of treatment of radiotherapeutic edema. Nevertheless, certain measures may prove of clinical benefit. A mixed diet with adequate protein content is essential. Histaminase and vitamin C should be tried.

TABLE I.—VARIATIONS OF IONS IN THE BLOOD IN IRRADIATED PERSONS

X-ray transmineralization	Edema favoring and preventing factors
Cations	
Na increased	Na edema favoring factor
K increased	K edema favoring factor
Ca decreased	Ca edema preventing factor
Anions	
Phosphate increased	Phosphate edema preventing factor
Bicarbonate decreased	Bicarbonate edema preventing factor
Cl decreased	Cl edema favoring factor
Decrease in anions—more acid valences	(NaCl edema favoring factor) as transitory effect

Foci of infection should be attended to. Alkaline gargles (colluttorium phenolis alkalinum) seem advantageous in conjunction with alkaline mixtures per os and 10 per cent calcium gluconate given intravenously. For the combating of pain spraying of the throat every 4 hours with a solution of urethane, 1:6 in water with 1 per cent ephedrine, 1 per cent cocaine, and a few drops of peppermint is recom-

TABLE II.—OTHER FACTORS WHICH MAY INFLUENCE THE EDEMA AS THE RESULT OF IRRADIATION

Edema producing factors	How affected by growth	How affected by X-rays
Damage to vessel wall	F	F F=edema
Capillary dilatation	F?	F favoring
Anoxia	F	F factor present
Increased hydrostatic pressure (passive)	F	F
Adrenalin deficiency	F	F
Infection	F	—
Inflammation	F	F
Pain (via sympathetic)	F	F
Lymphatics	F	F
Venous obstruction	F	F?
Organ activity (general)	F	F
Organ activity (specific)	F	F
Extravascular pressure	—	F
Scarring	—	F
Predisposing regional factors	F	F
Diffusion potentials	F	F
Metabolites	—	F
pH	F	F
Endocrines	F	F
Inanition	F	F
Histamine	?	F

mended. Some patients object to the bitter taste of the spray but all of them agree that they feel much better with the spraying than without it.

T. LEUCUTIA, M.D.

Lawson, F. E.: Gall Bladder Dye (Iodophthalein Sodium); Effect of Intravenous Injections on the Coronary Flow, Blood Pressure, and Blood Coagulation. *Arch. Int. M.*, 1945, 76: 143.

The dangers of intravenous cholecystography have been cited in the literature since 1925. A review of this literature by the author reveals that most of the patients sustained coronary arterial occlusion. One case of syncope with loss of the feces and urine was reported. Consequently, cardiovascular disease was regarded as the chief contraindication.

The author adds his experience with 4 cases. Two of these are classed as anaphylactic shock mainly because the fall of the blood pressure responded to epinephrine and to conventional shock therapy. One of the patients complained of substernal pain, which was not relieved by theophylline ethylenediamine, but serial electrocardiograms were negative.

The other 2 accidents are considered by the author as having been caused by coronary occlusion. Both patients showed electrocardiographic changes compatible with or indicating myocardial infarct. One patient died 14 days after the administration of the gall bladder dye (which in this case was given orally in contradistinction to the other cases). Both patients were known to have suffered from angina pectoris.

The following experiments were made in connection with this problem:

1. Measurement and kymographic registration of the coronary blood flow with the Morawitz cannula and of the carotid arterial pressure in 4 dogs, before, during, and after the intravascular injection of gall bladder dye. The dose was proportionate to that given to human adults. The injection caused a fall of the blood pressure and an increase of the coronary flow in all of the cases.

2. Determination of the influence of the gall bladder dye (iodophthalein sodium) on the coagulability of the blood of 7 human subjects by means of the De Takáts heparin tolerance test. In 4 cases the coagulation time was increased and in 3 cases it was decreased. The blood pressure dropped in 5 patients and remained unchanged in 2.

The author draws the following conclusions:

1. Iodophthalein sodium produces an increase in the coronary blood flow in dogs.

2. It causes the blood pressure to drop in human beings and in dogs.

3. The fall in blood pressure may explain the mechanism of shock which the author had occasion to observe twice.

4. The mechanism causing coronary arterial occlusion is not clear.

5. The intravenous injection of iodophthalein sodium is contraindicated in persons with coronary arteriosclerosis (if for no other known reason than the drop in blood pressure it causes).

GERHART S. SCHWARZ, M.D.

MISCELLANEOUS

GENERAL BACTERIAL, PROTOZOAN, AND PARASITIC INFECTIONS

Vinnard, R. T.: Three Hundred and Fifty-Two Cases of Tetanus. *Surgery*, 1945, 18: 482.

Among 352 patients with tetanus treated from November 1, 1934 to October 31, 1944 the total mortality was 45 per cent; excluding the deaths which occurred in the first 36 hours, the net mortality was 34 per cent. In the past 3 years the mortality rate was substantially reduced (a total mortality of 31 per cent and a net mortality of 18 per cent). Routine immunization by means of tetanus toxoid among the population of tetanus-prevalent areas, as effectively practiced by the Armed Services in World War II, is highly desirable.

Reduction in the mortality rate would also be furthered by the following procedures: 1. Routine administration of prophylactic antiserum (preferably 3,000 or more units) in the treatment of all injuries to patients who have not previously received toxoid immunization. 2. Education of lay people to report early, and of doctors to recognize and institute immediate therapy for symptoms of early tetanus. 3. Immediate intravenous administration of adequate amounts of antiserum. 4. Complete excision or débridement of all possible foci of infection, including umbilectomy in cases of tetanus neonatorum. 5. Adequate sedation. 6. Therapeutic doses of sulfonamides to prevent secondary infection and as prophylaxis against pneumonia. 7. Daily intramuscular administration of from 40,000 to 50,000 units of antiserum to all patients in whom the original foci of infection cannot be found or be completely removed. 8. Good nursing care. 9. Adequate caloric and fluid intake by means of stomach tube feedings. WALTER H. NADLER, M.D.

MacFarlane, R. G., and MacLennan, J. D.: The Toxemia of Gas Gangrene. *Lancet*, Lond., 1945, 249: 328.

The clinical features of toxemia in gas gangrene have been described. A "collagenase" has been identified in clostridium welchii toxin, and its significance in gas gangrene discussed. The possibility that the general toxemia of gas gangrene is not due to alpha toxin but to the products of tissue breakdown has again been studied, particularly in animals. Some evidence in favor of this theory has been obtained. A possible relationship between the toxemia of gas gangrene and that seen in other forms of shock has been noted.

MacLennan, J. D., and Macfarlane, R. G.: Toxin and Antitoxin Studies of Gas Gangrene in Man. *Lancet*, Lond., 1945, 249: 301.

By the lecithovitellin reaction it is possible to make sufficiently reliable titrations of alpha-toxin of clostridium welchii and its corresponding antitoxin for observations in the field.

As diagnostic procedures in early gas gangrene, neither the lecithovitellin nor the hyaluronidase test has proved satisfactory.

In 4 of 27 cases of gas gangrene—almost all of them caused by clostridium welchii—free alpha-toxin was detected. In only 1 instance, however, was a positive reaction obtained with material taken during life. WALTER H. NADLER, M.D.

Hall, I. C.: The Occurrence of Bacillus Histolyticus in Accidental Wounds without Recognized Specific Infection. *Surgery*, 1945, 18: 369.

The comparatively infrequent demonstration of bacillus histolyticus in accidental wounds probably gives an erroneous conception of the true frequency of its occurrence. This bacillus is easily overlooked in a bacteriological examination of a mixed infection. On media the organism grows in minute colonies that are likely to be overlooked in a mixed culture by all but the best trained and most meticulous bacteriologists. This accounts for the fact that, although widespread in nature, the bacillus histolyticus was not discovered until 1916.

Pure infections with this organism are rare. The typical lesions produced by pure infections of bacillus histolyticus are most often masked in cases with mixed infections and therefore not recognized.

The bacillus histolyticus was demonstrated in cultures taken from the débrided tissues in 17 civil wounds. There were 7 compound fractures, 5 lacerations, 3 gunshot wounds, and 2 burns. This was believed to be the first time that this organism was demonstrated in burns. DAVID H. LYNN, M.D.

Willett, F. M., and Weiss, A.: Coccidioidomycocis in Southern California; Report of a New Endemic Area with a Review of 100 Cases. *Ann. Int. M.*, 1945, 23: 349.

A new and rather large endemic area of coccidioidomycosis is reported with this review of 100 cases. The region is roughly triangular, bounded by Banning and Needles, California, and Yuma, Arizona. Following admission of a number of cases of the disease to the March Field Station Hospital, repeated skin tests were made on 573 soldiers, representing both white and colored troops, who were performing a dusty type of work at the edge of the desert. In 135 men a "change over" from negative to positive skin reaction was found. Of these men, 83 were hospitalized with acute pulmonary coccidioidomycosis. The remaining 52 had insufficient findings to warrant hospitalization and were eventually classified in the clinically inapparent group. These findings established the fact that a considerable part of this desert area was endemic for coccidioidomycosis.

The cases reported here presented no diagnostic problem, since 83 were found as a result of the epidemiological survey, and 17 additional cases came from the desert area. The history shows residence, assignment, travel, or recent activity in a known or suspected area. A suggestive history in the presence of a pulmonary ailment requires consideration of coccidioidomycosis in the differential diagnosis. By far the greater number of initial infections with coccidioidomycosis are of the inapparent or asymptomatic type. In decreasing order of frequency the symptoms occurring in 100 cases of pulmonary coccidioidomycosis were fever, chest pain, cough, malaise, anorexia, headache, pharyngitis, chills, cutaneous manifestations, joint pains, conjunctivitis, and hemoptysis. Physical examination is only moderately helpful in the diagnosis. Most of the patients are obviously suffering from a respiratory infection without specific physical findings. Unless there are skin or joint manifestations, the physical signs are not revealing. Roentgenograms are of great help both in the diagnosis and in following the course of the disease. The roentgenological findings may be roughly divided into the following categories: (1) varying degrees of parenchymal infiltration; (2) hilar adenopathy and thickening; (3) fluid; (4) nummular densities; (5) cavitation; and (6) bone lesions.

The skin test is probably the most helpful single test when used in conjunction with other aids, i.e., travel history, roentgenograms, sedimentation rate, differential blood count, and serological studies. Failure to react to coccidioidin used as an intradermal skin test in a concentration of 1:100, rules out the possibility of coccidioidomycosis provided sufficient time has elapsed to permit the individual to develop the necessary sensitivity, except in those patients with disseminated infections. Serological studies were of inestimable value both in making a definite diagnosis and in following the course of the disease. Dissemination was predicted before it occurred in every case by serological tests on the basis of high titers in complement fixation. This was not based on the reaction to the skin test, which in 1 instance of dissemination was completely negative. The declining antibody titer was used as an index of safety in mobilization of the patient. The differential and total leucocyte count was of interest mainly because of the eosinophilia, which varied between 5 and 18 per cent of the total leucocyte count. The erythrocyte sedimentation rate was of considerable value, being increased in all patients and varying between 16 mm./hr. and 46 mm./hr. This test was useful both in diagnosis and prognosis. The impression was obtained that sputum examination in the diagnosis of coccidioidomycosis is not an entirely satisfactory method of diagnosis.

Cavitation and dissemination are the two main complications of the disease. The latter is of far greater importance than the former although probably less frequent. In 2 cases of cavity in white soldiers one cavity closed and the other showed a strong tendency toward closure, while in 4 cases of cavity in negroes only 1 cavity closed. Despite the conservative treatment accorded the patients in this series, dissemination occurred in 4 patients, all of whom were colored soldiers with complete bed rest. One of the cases terminated fatally, with a generalized miliary dissemination.

The average case of acute pulmonary coccidioidomycosis has an extremely good prognosis for complete recovery. Barring dissemination or complicating cavitation, the average case is almost in the class of a self-limited disease when given proper treatment. The main essential of treatment is adequate bed rest, and until the condition is markedly improved this should be absolute bed rest. The criteria for return to duty were based on the clinical findings, roentgenograms, sedimentation rates, serological studies, and absence of evidence of dissemination. Illustrative cases are presented.

JOHN L. LINDQUIST, M.D.

Ory, E. M., Meads, M., Brown, B., Wilcox, C., and Finland, M.: Penicillin Levels in Serum and in Some Body Fluids during Systemic and Local Therapy. *J. Lab. Clin. M.*, 1945, 30: 809.

The rational choice of dosage and route of administration of penicillin presupposes some acquaintance with the effective concentrations of the antibiotic which can be attained and maintained at the site of the infection by the different methods. The desired concentration in any given case will depend, of course, on the susceptibility of the infecting organism. This communication deals with the concentrations of penicillin obtained in serum and in certain body fluids of adult medical patients after the administration of various doses of commercial penicillin by different routes. The data were obtained almost entirely on patients while they were under treatment. The method used is subject to considerable error, but it is adequate for these purposes since it was not intended here to offer any accurate measures of the absorption and fate of penicillin in the body.

The concentrations of penicillin which destroy the common bacteria encountered in "medical" infections were studied by the authors by a very similar method so that the results are comparable. They indicate that the smallest concentration of penicillin which was measured in the present study, namely, 0.03 unit per cubic centimeter, is adequate to sterilize actively growing cultures of almost all strains of the gonococcus, group A hemolytic streptococcus, about half of the strains of the meningococcus, and a somewhat smaller proportion of the strains of the pathogenic staphylococci. Undoubtedly the accessibility of the penicillin to the organism and many other factors, most of which are still unknown, come into play and account for some of the discrepancies between the in vitro and in vivo results.

The serum levels of penicillin obtained after various doses and intervals during systemic administration indicate that for any given dosage only a

range of levels rather than any specific values can be predicted. In general, higher levels are attained and sustained with the larger and more frequent doses. The levels are not directly proportional to the increase in the dose except possibly in any given individual under constant intravenous therapy. The results in patients with cardiac or renal insufficiency indicate that the volume of urinary output and the state of the kidney function may materially affect the height and persistence of penicillin levels after any given dose. Such patients usually attain and maintain any given level with appreciably smaller doses given at longer intervals than do persons with normal renal function and those who excrete larger volumes of urine.

The problem of whether or not topical injections are necessary in cases of meningitis, infection of the serous cavities, or walled-off focal abscesses will be answered more directly on the basis of clinical results than by any analysis of data such as those given in this article. The present observations and similar studies by others indicate that there is some diffusion into all serous cavities but that this is erratic and usually only slight. Clinically, it is already recognized that these infections, after they have become established, do not often respond to systemic treatment alone in spite of the fact that bacteriostatic concentrations for the offending organisms can often be demonstrated in the exudate.

In cases of meningitis there are differences expressed in the literature, both as to the penetration of penicillin into the cerebrospinal fluid and as to the necessity for having such penetration. Small amounts of penicillin have been found by others in individual cases, particularly after massive systemic doses. This has not been the authors' experience nor that of others who have used larger doses in a greater number of cases. Some cases of bacterial meningitis have been reported as cured without resort to intrathecal injections of penicillin, but these cases are not entirely convincing since few, if any, of the patients had received systemic penicillin as the only specific therapy. On the other hand, the experience in the authors' clinic and in many other clinics indicates that not only is intraspinal therapy necessary but in some instances it is necessary to resort to injections into the cerebral subarachnoid space or even into the ventricle for complete recovery.

The necessity for systemic treatment when penicillin injections are given into infected body cavities will depend on the circumstances in each case. Some absorption takes place from all the cavities, but this, too, is erratic and therefore the effective levels are sustained in the circulation for variable periods. Some workers have found the poorest absorption from thick walled cavities and from abscesses which are walled off. Obviously, therefore, if there is evidence of infection of tissues away from the infected cavity into which the penicillin is being injected, systemic treatment is definitely indicated. The absorption from the cavity may, however, be adequate to protect against spread of the infection from the site of the injection as a result of the procedure. It is possible that diffusion out of cavities is delayed in some cases when systemic therapy is given at the same time and that may be a reason for using it. Evidence for this, however, is scant.

BENJAMIN GOLDMAN, M.D.

DUCTLESS GLANDS

King, B. T., and Rosellini, L. J.: The Treatment of Acute Thyroiditis with Thiouracil. *J. Am. M. Ass.*, 1945, 129: 267.

A series of 11 cases of acute thyroiditis is reported in which cure was effected in 8 by the administration of thiouracil. Initially the drug was tried experimentally on a woman who complained of increased nervousness and irritability and who was found to have an acutely swollen and tender thyroid gland, a temperature of 99.6, and an elevation of the white blood count. After receiving 0.2 gm. of thiouracil t.i.d. for 7 days she was well and free of symptoms, although the thyroid gland remained enlarged and indurated. Continuation of therapy with dosages of 0.2 gm. of the drug daily for two weeks resulted in return of the gland to normal size and consistency. The patient was subsequently observed for 4 months with no change in her condition.

Although penicillin has not been employed, other methods have proved ineffectual in the treatment of acute thyroiditis; iodine, rest, hot applications, ice bags, and sulfonamides were of no value. Although x-ray radiation was found definitely to shorten the duration of the disease, varying degrees of hypothyroidism and myxedema have resulted from this procedure in a discouraging number of cases. Bacterial cultures of diseased thyroid tissue removed by surgery have never been positive, but it was intimated that the possibility of virus etiology of this condition deserved investigation, with possible bearing on the mode of action of thiouracil.

Cases for the series were carefully selected, 7 cases of acute thyroiditis being included with 3 cases of migrating thyroiditis (the acute process beginning in one part of the gland and spreading to the rest) and 1 case of Hashimoto's struma. Cases of toxic goiter, suppurative thyroiditis, Riedel's struma, and longstanding colloid and adenomatous goiter were not included. The diagnosis of acute thyroiditis, a clinical rather than a pathological one, was made on the basis of enlargement, tenderness, and firmness of all or part of the thyroid gland together with the clinical findings mentioned in the previous case history.

In the 8 cases cured, the treatment was continued for 3 weeks or less. All of the patients were symptom free in one week, and in all the glandular enlargement and tenderness disappeared. In 1 case treatment had to be terminated before the 3 weeks were up because of intolerance to the drug, but nevertheless this case was included in the group of cures. In 2 of the 3 other cases treated with thiouracil the

condition was misdiagnosed and subsequently found to be toxic goiter and Hashimoto's struma, respectively, while the third case had received prolonged x-ray therapy previously.

It was concluded that thiouracil is a specific in the treatment of early acute thyroiditis.

PHILIP B. CHASE, M.D.

Grainger, A., Gregson, D. A., and Pemberton, H. S.: Thiouracil in the Treatment of Thyrotoxicosis. *Brit. M. J.*, 1945, 2: 343.

In a series of 29 cases of thyrotoxicosis treated with thiouracil 22 of the patients were benefited. In 12 patients the improvement was marked. In 3 patients with secondary hyperthyroidism the response was so slight that thyroidectomy was required.

Among the patients with the secondary type, improvement was noted in only 2 of 8, whereas among cases of primary hyperthyroidism, improvement occurred in 19 of 21. Sections of the thyroid gland removed in 2 cases are described.

The chief toxic symptoms noted were faintness, flushing, and vague muscular pains in the chest, head, and neck. Absolute granulocytopenia of varying degree, with lymphocytosis, appeared in nearly every case, usually from the seventh to the tenth day. One patient developed true agranulocytosis and 2 others had neutropenia severe enough to warrant active therapy. One patient had a marked purpuric rash after 18 days; 1 developed drug fever, and several showed rashes of maculopapular or scarletinal type. The effect of thiouracil is recorded in cases of hypertension and diabetes mellitus, cardiac failure, and myxedema.

WALTER H. NADLER, M.D.

Martin, L.: The Pathology of Colloid and Nodular Change in the Thyroid Gland and Its Application to the Surgery of Nodular Goiters. *Brit. J. Surg.*, 1945, 33: 62.

Examination was made of 100 thyroid glands from postmortem subjects over 45 years of age in whom, so far as was known, there had been no clinical evidence of thyrotoxicosis. By naked eye and histological examination, it was possible to classify the 100 glands as follows:

Type	Number	Average Weight in grams
Average normal	26	25.7
Atrophic	15	16.3
Colloid		
a. Diffuse colloid	30	28.8
b. Nodular colloid	29	44.4

The outcome of this study and discussion of the pathology of colloid and nodular change in the thyroid was summed up as follows:

Colloid change is common in the thyroid glands of persons over the age of 45 years; nodule formation and degeneration are inherent and almost universal accompaniments of increasing age.

Nodules often occur within the gland substance and cannot always be detected by external examination alone.

The histological appearance of nodular colloid thyroid glands from elderly nonthyrotoxic individuals is indistinguishable from that of nontoxic nodular goiters and of the milder toxic nodular goiters. Localized areas of hyperplastic epithelium in a nodular thyroid or a nodular goiter are not reliable evidence of secondary thyrotoxicosis.

In applying these principles to surgery of the nodular goiter, it is believed that "dissection - enucleation" and hemithyroidectomy are illogical and even dangerous for two main reasons: (1) the whole thyroid gland is affected in secondary thyrotoxicosis and not the nodules alone, hence local removal of the latter cannot be adequate treatment; and (2) local removal of the nodules, although it may relieve pressure symptoms, cannot prevent other nodules from forming in the thyroid residue. Patients who have undergone one or more of such piecemeal operations without protection from recurrent thyrotoxicosis, further nodule formation, or subsequent thyrotoxic heart failure are still regrettably common.

The observation in this study that only a small minority of the nodules presented themselves at the gland surface is an additional reason for refuting minor thyroid surgery.

As total a thyroidectomy as possible is recommended, in all cases of nodular goiter which come to operation, whether for clinical thyrotoxicosis, relief of pressure symptoms, or for cosmetic reasons. The risk of hyperthyroidism is not great in later life, and even should it occur, substitution therapy with thyroid extract is preferable to thyrotoxic heart failure or further operations. The operative safeguards for preservation of the recurrent laryngeal nerves and adequate parathyroid tissue are used.

The authors consider it wrong to advise removal of every nodular goiter as insurance against future trouble. Much will depend upon individual factors in each case, but, in general, it is reasonable to keep the patients under observation, and to advise thyroidectomy only at the first indication of thyrotoxic or pressure symptoms. LUCIAN J. FRONDUTI, M.D.

SURGICAL PATHOLOGY AND DIAGNOSIS

Thomson, J. G.: Fatal Bronchial Asthma Showing the Asthmatic Reaction in an Ovarian Teratoma. *J. Path. Bact.*, Lond., 1945, 57: 213.

A true fatal case of bronchial asthma is reported in detail from the pathologist's standpoint.

The postmortem findings in the lungs consisted of diffuse bronchial blockage by mucus, eosinophile infiltration of the bronchial mucosa and submucosa, hyaline degeneration of the basement membrane, pulmonary emphysema, and contraction of the bronchi.

Of special interest in this case was the finding of an ovarian teratoma containing respiratory epi-

thelium. The latter participated in the asthmatic reaction by an eosinophile infiltration, and Charcot Leyden crystals and thickening of the basement membrane similar to that described for the lungs were present. BENJAMIN G. P. SHAFIROFF, M.D.

EXPERIMENTAL SURGERY

Gregory, R., Ewing, P. L., Levin, W. C., and Ross, G. T.: Studies on Hypertension; Bioassay of Vasoconstrictor Substances in Ultrafiltrates of Citrated Blood Plasma from Patients with Normal Blood Pressures, Patients with Essential Hypertension, and Patients Made Hypersensitive by Intravenous Injections of Angiotonin (Hypertensin). *Arch. Int. M.*, 1945, 76: 11.

Bioassays were made to determine the presence of vasoconstrictor substances in the blood of hypertensive patients and of others temporarily hypertensive as a result of the injection of angiotonin. The determinations were made on ultrafiltrates of citrated plasma.

Angiotonin could be assayed from ultrafiltrated plasma after the injection of this drug. The blood from chronic hypertensive patients was found to contain less vasoconstrictor substance than that found after experimental agiotonin hypertension. Furthermore, the vasoconstrictor effects of ultrafiltrated plasma were the same in normotensive and hypertensive subjects. Angiotonin was not found to be increased in the blood of patients with hypertension. Essential hypertension is not believed to be due to angiotonin.

BENJAMIN G. P. SHAFIROFF, M.D.

Gross, R. E., and Hufnagel, C. A.: Coarctation of the Aorta. *N. England J. M.*, 1945, 233: 287.

Coarctation of the aorta is an unusual abnormality, but it occurs with sufficient frequency and is accompanied by severe enough complications to warrant a search for technical methods for its surgical correction. A high degree of obstruction carries the hazard of complications, such as aneurysmal dilatation above or below the constricted zone, dissecting aneurysm, rupture of the aorta, superimposed streptococcus viridans infection, and severe hypertension in the upper part of the body. Several methods of surgical attack on coarctation of the aorta are conceivable: the constricted zone might be by-passed by the establishment of a collateral channel; the constricted portion of the aorta might be excised and the resulting gap bridged by the implantation of a segment of vein, with the nonsuture method; following excision, the gap could be bridged by implanting into it, by end-to-end suture, a segment of vessel that has been preserved from autopsy on another subject; excision of the constricted portion followed by freeing of the aortic arch and thoracic aorta and reunion of the ends by primary suture. Most of the experimental work done by the authors involved the latter method.

Data of experiments on division and suture of the aorta in 17 dogs are presented. A posterior approach

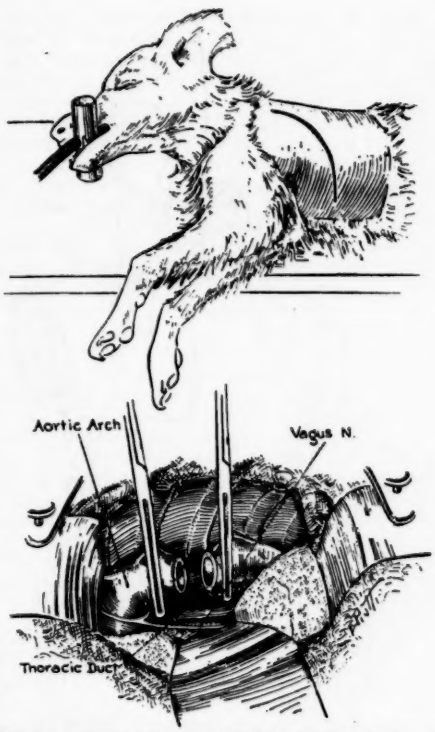


Fig. 1. General exposure obtained through a posterior thoracic incision. Special clamps are applied to the aorta which is then divided.

was found to be most advantageous (Fig. 1). The aorta was carefully dissected from its bed and each intercostal artery was doubly ligated and divided. Two special clamps were applied to the aorta, which was then divided. In some cases a segment of aorta was cut out and discarded. The cut ends were drawn together and sutured. Three general types of suture were employed, although the method illustrated (Fig. 2) gave the most satisfactory reconstruction.

Total obstruction of the aorta had no important deleterious effects on the heart action in any of the animals. Whenever clamps were removed from the obstructed aorta, however, the heart rate increased greatly and the work of the organ was obviously enormously augmented. The period of subsequent slowing of the heart required several minutes. The temporary rise of the pulse rate was not usually serious, although one dog died at this time, apparently of cardiac strain. It was found that the momentary embarrassment could be greatly reduced if the clamps were taken off gradually to permit readjustment in the vascular system. Postmortem studies showed a marked tendency for endothelium to cover the line of anastomosis in a short time, and intra-

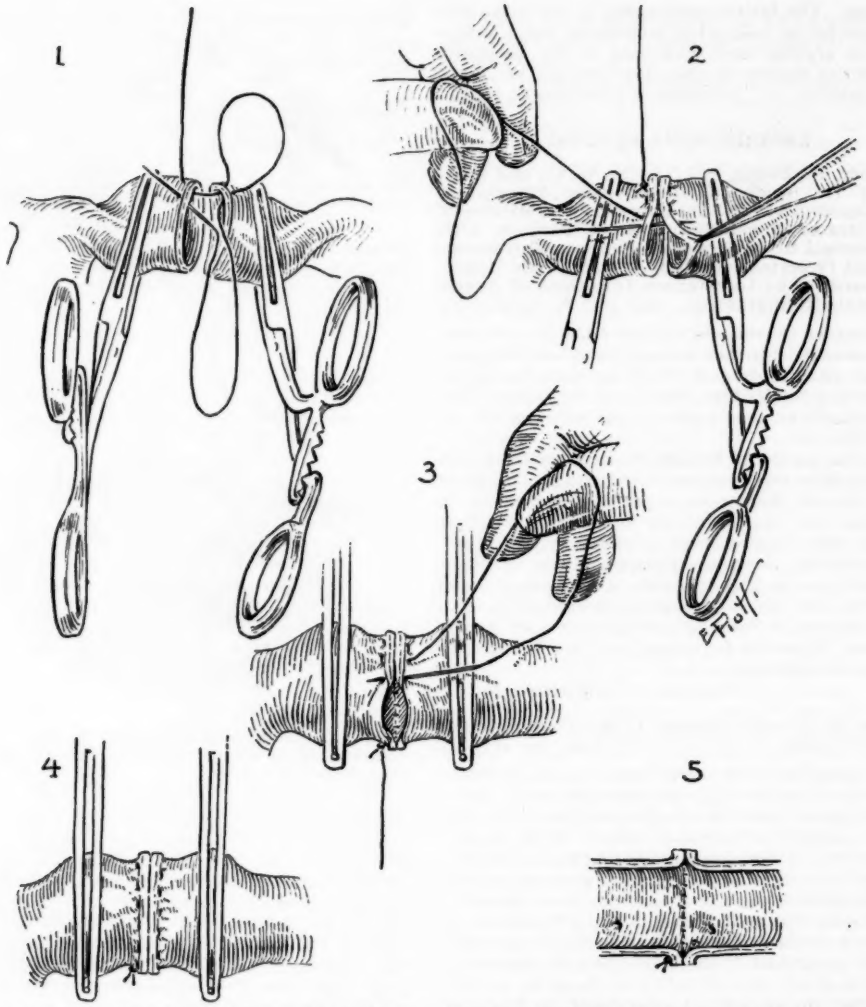


Fig. 2. Details of the end-to-end suture of the divided aorta. 1. The aorta is temporarily rotated so that the back wall can be stitched first. 2. The back wall is sutured with a continuous, everting stitch that includes the full thickness of the aortic wall. 3. The aorta is allowed to rotate back into normal position; the back wall suture being complete, the stitch is carried around onto the front wall. 4. The anastomosis is complete, the edges of the aorta being everted. 5. A cross section shows that the intimas of the upper and lower segments are in contact with each other.

luminal clotting at the site did not prove to be a serious factor with the method of suture illustrated. A serious complication of these operations was hindquarter paralysis. Studies of this complication were made by occluding the aorta in 20 dogs for varying periods of time, and it was found that paralysis did not develop when the aorta was obstructed for less than 10 minutes.

Two human patients have been operated upon for coarctation of the aorta. One of them survived, while the other died with an uncontrollable dilatation of the heart following removal of the clamps. This emphasizes the importance of slow removal of the aortic clamps.

It is concluded that it is technically feasible to remove a narrowed portion of the aorta in man and

to re-establish aortic continuity by the method described. JOHN L. LINDQUIST, M.D.

Crimm, P. D., and Martos, V. F.: Studies in Oleothorax. The Bacteriostatic Action of Oils on the Tubercle Bacillus. *J. Thorac. Surg.*, 1945, 14: 265.

Several of the unsaturated fatty acids have been reported to be bactericidal for the tubercle bacillus. In this experimental study the authors found that cod liver oil and peanut oil have no effect on the virulency of the tubercle bacillus.

The difference between these results and those of other investigators may be due to a marked difference in the resistance of the bacterial strains used (by the other workers and the authors) to cod liver oil, or to a difference in the oils employed. It is possible that the oils available today are more highly purified than those of a decade ago, and have been freed from the substances responsible for the bacteriolytic action.

Gomenol was included in this study because it has been used extensively in "disinfection" oleothorax. Cod liver oil and peanut oil were studied because of the reports of their inhibitory effect on the tubercle bacillus. The authors concur that these oils have an inhibitory action on the growth of the tubercle bacillus. However, the subsequent growth of the organisms on a rich medium and their normal virulence when injected into guinea pigs indicate that the oils adherent to the tubercle bacilli inhibit their growth by a physical rather than by a chemical action. JOHN E. KIRKPATRICK, M.D.

Crimm, P. D., and Westra, J. J.: Studies in Oleothorax. The Use of Oils in Disinfectant Oleothorax and in the Re-expansion of the Lung in Tuberculous Empyema (Preliminary Report). *J. Thorac. Surg.*, 1945, 14: 270.

Oleothorax with peanut oil and cod liver oil has definitely established its value in controlling tuberculous infection of the pleura. Further treatment of the empyema space is determined by the condition of the lung. The authors have found that an oleothorax of irritant oils produces an obliterative pleuritis and seals over the subpleural foci of infection. If the visceral pleura is not too thick and the lung shows a tendency to re-expand, an uncontrolled infection in the lung can be given priority and the oleothorax continued. When the parenchymal lesion is healed, the lung may be allowed to re-expand. The lung gradually re-expands, if assisted by the periodic removal of oil and air, if they are present, and by the maintenance of negative intrapleural pressures. If the lung does not re-expand entirely, a less extensive thoracoplasty than would otherwise be necessary can be performed. This early use of irritant oils may obviate the mutilating Schede procedure.

In the conduct of oleothorax, frequent examination of the patient with periodic removal of pus or fluid, and maintenance of negative intrapleural pressures, is mandatory. This avoids empyema or escape of oil through a needle opening, and diminishes the chances for the formation of a bronchial fistula. There is great individual variation in the rate of fluid or pus formation, and disappearance of the tubercle bacilli. Oil and a little fluid, with or without bacilli, can be present in the chest for an indefinite period without clinical symptoms. One patient with diabetes, a very poor surgical risk who had a tuberculous empyema, carried cod liver and pus in the pleural space for 6 years before a bronchial fistula developed. This patient failed to report for aspirations during this time and increased tension helped to cause the fistula.

With oleothorax, the surgical problems of aspiration are diminished, and closed drainage with empyema tubes and catheters is eliminated. The authors have always considered open drainage contraindicated, unless a bronchial or pleural fistula is present. Of 20 patients with varying degrees of purulent effusion and empyema, 6 experienced re-expansion of the lungs without reactivation of the pulmonary infection or further plastic operation for closure of the pleural space. Of the remaining 14 patients, 10 now have oleothoraces which are negative for tubercle bacilli. Re-expansion of a lung may be lifesaving to the patient if a tuberculous infection develops or is present in the other lung, as it was in 11 cases of this series. The use of irritant oils in oleothorax adds a reversible procedure to the treatment of tuberculous empyema, which heretofore has often demanded an irreversible one.

JOHN E. KIRKPATRICK, M.D.

Zerbini, E. D.: The Importance of Ascorbic Acid (Vitamin C) in Chest Surgery. *J. Thorac. Surg.*, 1945, 14: 309.

The closure of the bronchi after partial or total resection of the lung, and the gastroesophageal anastomosis still constitute two important problems in thoracic surgery; defective cicatrization frequently occurs in both cases, and results in a bronchial or esophageal fistula. The surgical technique employed in the procedure is very important in the prophylaxis of these complications and in obtaining a good scar, but the technique constitutes only one of the factors influencing scar formation. In many cases it is impossible to obtain a good suturing because of local conditions, but even with the best technique the disruption of the sutures, from lack of scar formation, may occur.

The amount of ascorbic acid in the blood and in the tissues has been considered one of the most important factors in the formation of the intercellular collagenous tissue, and in the strength of the scar, both in animals and in human beings. The amount of ascorbic acid in some patients was studied by the author before and after lobectomy, pneumonectomy, and esophageal resection. The blood proteins of these patients were tested continuously because hypoproteinemia is another important factor in scar formation which should always be corrected.

The chest condition which brings the patient to the hospital may be responsible for a low plasma ascorbic acid level before the operation. In 22 patients examined, the average level found just after admission was 0.15 mgm. per cent of plasma ascorbic acid (normal considered between 0.8 to 1.2). Only 1 patient had a normal blood level before operation and 9 patients showed complete absence of ascorbic acid in the plasma.

The operation by itself reduces considerably the plasma ascorbic acid, according to the severity of the surgical procedure. This level remains low during a long or short interval according to the postoperative complications and treatment.

The author found that it is possible to maintain an almost normal plasma ascorbic acid level before and after the operation with the administration of 1,000 mgm. of ascorbic acid every 24 hours.

The determination of the white cell platelets ascorbic acid gave different results in different patients. When the general condition was good and the patient was a good risk, the white-cell platelet level did not change with the operation, even when the plasma level was zero. In one patient with esophageal cancer and artificial alimentation through a gastrostomy, the plasma and white-cell platelets were both found deprived of ascorbic acid, a condition which represents a prescorbutic state without clinical evidence.

The amount of ascorbic acid in muscle and lung tissue removed during the operation seems to be below the values considered as normal by different authors.

The author draws from his studies the conclusion that all patients with chronic surgical chest conditions should be given high doses of ascorbic acid before and especially after important surgical procedures.

JOSEPH K. NARAT, M.D.

Harper, W. H., and Blain, A., III: The Effect of Penicillin in Experimental Intestinal Obstruction. *Bull. Johns Hopkins Hosp.*, 1945, 76: 221.

The purpose of this study was to reinvestigate the role of bacteria in producing death in dogs having isolated, obstructed jejunal loops, since antibacterial agents were not available to earlier workers in this field. Potent antibacterial agents, especially penicillin, having no known important chemical or other reaction on the body were used. In studies on the problem of "toxemia" in relation to intestinal obstruction the use of the isolated obstructed loop is valuable, because the factors of pancreatic juice, bile, and decomposed food substances are eliminated; loss of electrolytes and water by vomiting is largely obviated; and the blood chemistry remains normal or nearly normal. The factors which remain and can be evaluated are the presence of bacteria, stasis, and distention.

In all dogs a portion of jejunum about 12 cm. in length was resected and its blood supply was left intact. Intestinal continuity was restored by end-to-end suture. Specimens for bacteriological study were obtained from the loop, which was then washed free of gross intraluminal material and closed at both ends by inversion. Fifteen dogs received no penicillin therapy and were used as controls. In 15 other dogs 50,000 units of penicillin in 4 c.c. of saline solution were introduced into the loop before it was closed, and 5 additional dogs were given large doses of penicillin intramuscularly starting at the time of operation.

All of the control dogs with isolated, obstructed high intestinal loops died within 6½ days. All of the 15 dogs in whose isolated loops penicillin was introduced were protected for 9 days, while 93 per cent were protected for 13 days, and 60 per cent were protected for over a month. Five dogs treated parenterally with penicillin were protected for more than 18 days.

Marked distention of the loop occurring in the presence of bacteriostatic agents is compatible with life. In the absence of distention of the loop an abundant bacterial flora uninhibited by bacteriostatic agents is compatible with life. These experiments indicate that distention must be present before infection of the intestinal wall by the normal intestinal flora can occur.

Microscopic and bacteriological evidence is presented to show that penicillin given prophylactically in large doses can prevent infection of the distended intestinal wall by the normal intestinal bacteria.

JOHN L. LINDQUIST, M.D.